NON-VERBAL GLASS ROOM INTERACTION IN TEACHER EDUCATION

RAKESH JAIN

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ABOUT THE BOOK

This book is the outcome of a study designed to have a look at the importance but rather neglected dimension of teacher behaviour, that is, NON-VER-BAL TEACHER BEHAVIOUR. Teaching is not merely talking, and if teachers are to become effective in their classrooms, they need to become attentive not only to what they are communicating but also to how they are communicating. They need to know the importance of their nonverbal cues, for silent language is more powerful than verbalism. In fact, nonverbal cues may be more significant than verbal cues when a pupil attempt to ascertain the feelings and attitudes of the teacher. From facial expressions and gestural movements, the pupil may infer moti vation states within the teacher or h may discern a positive or negative attitude.

The present work is the first attem in Indian educational setting, whi has proved into the nonverbal integers on all relationship between teach and students.

In addition, this book lucidly cusses the procedure of observation analysis of nonverbal behaviour in classroom situation, and disp the qualitative analysis of data in form of clock-wise and box diagrams to make the nature of flow of nonverbal events easily prehensible, besides suggesting flavenues of research in the newly eing areas of teaching, teacher behand teacher education.

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Non-verbal Classroom Interaction in Teacher Education

NON-VERBAL CLASSROOM INTERACTION

IN TEACHER EDUCATION

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Dedicated to My Parents

RAKESH

Foreword

The teaching-learning process is essentially a communication endeavour, in which both teachers and students try to get a desire I response and the criteria of their success is whether they get it. With this assumption, many researchers have explored the communication behaviour that takes place in the classroom situation. For quite some time, the communication principle has been considered as one of the important aspects of effective teaching in teacher-preparation programmes. However, until recently such efforts have been almost concerned with the spoken word, because it was believed that teaching is mere verbalism.

The messages and informations are not communicated by words alone. The tone of voice, choice of words, eye movements, facial expressions, gestures and postures—all contribute to give it a full meaning. The importance of non-verbal cues cannot be denied. It is interesting to note that non-verbal medium has been the mainstay of lovers since the origin of man, who often communicate without words. So, another channel of communication and influence is non-verbal communication. Infact, it is teacher's non-verbal behaviour that is responsible for the formation of students' attitudes towards school and school-subjects.

Some work on non-verbal behaviour has already been initiated in foreign countries and I am very happy to know that an effort has been initiated in India in this direction by Dr. Rakesh Jain. It is imperative to do research in this neglected field of work. I hope that this study will add to this unexplored area of knowledge. It will also assist in the formulation of teaching models and evolving teaching theories, which is emerging as a new area of study. To be true, the non-verbal communication is an integral part of total teaching process and it need not be overlooked or under-estimated.

Really, I feel great pleasure to write a foreword to the book 'Non-verbal Classroom Interaction In Teacher Education' written by Dr. Rakesh Jain, which, I hope, will provide a new direction to the field of teacher education in particular and education in general.

Dr. S. P. Ahluwalia

Professor, Head and Dean,
Faculty of Education
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Preface

Educational scientists are busy in formulating instructional theories and for this venture, a large number of investigations are being made on teacher verbal behaviour neglecting the non-verbal behaviour. But any instruction without considering teacher nonverbal behaviour will be incomplete and there is a need to conduct researches on non-verbal teacher behaviour. Non-verbal cues influence perceptions, and both teachers and students take the non-verbal expressions of the other as symptomatic of inner feelings and In reality, teacher-pupil interpersonal relations are distinguished by spontaneity and immediate response. Therefore, nonverbal reactions are prominent for the formation of attitudes since they stem from unwitting responses. The acts of a teacher suggest a reflection of the teacher's self. The separation of verbal and nonverbal communication for the purpose of any theory building is unrealistic as the two types of communications are interrelated in any type of interaction—classroom or outside classroom. This study was an attempt to fill up this gap. It has explored 'Non-verbal Classroom Interaction Patterns of Language, Social Studies and Science Teachers.'

The author takes this opportunity to express his sense of gratitude to Dr. R. A. Sharma, Professor, Department of Education, Institute of Advanced Studies, Meerut University, Meerut, under whose scholarly and expert guidance this work was designed and completed. A debt of gratitude is also acknowledged to Dr. R. P. Bhatnagar, the then, Professor and Dean, Faculty of Education, Meerut University, Meerut for his valuable suggestions and encouragement for pursuing the work. Dr. C. M. Galloway, Professor, Faculty of Curriculum and Foundation, The Ohio State University, Ohio (USA), acquainted the investigator with his invaluable guidance on non-verbal communication. Dr. Russell Lee French, Professor, Department of Curriculum and Instruction, College of Education, The University of Tennessee, Knoxville (USA) provided him with

useful literature which enabled him to understand the actual procedure of encoding and decoding the non-verbal communication, without which this work could not have been possible. Professor Cecil R. Trueblood and his student Dr. Nancy Hykes Stankus of Pennsylwania State University, Division of Curriculum and Instruction were of great assistance to the author as they provided information about references and sources of literature. Sincere thanks are paid to them all.

To Dr. B. K. Passi, Professor and Head, Department of Education, University of Indore, and Dr. R. S. Pandey, Professor, Department of Education, University of Allahabad, who have been a constant source of encouragement and motivation for doing hard work.

Deep gratitude is shown to teachers like Dr. K. G. Sharma, Dr. J. P. Shrivastava, Dr. K. K. Vashistha, Dr. Suraksha, and my colleagues and friends Dr. S. P. Gupta, Dr. N. K. Garg, Dr. K. S. Misra, Dr. S. P. Agarwal, Dr. H. C. Rathore, Dr. P. C. Shukla, Shri P. N Maheshwari, Shri A. K. Gaur, Shri S. P. Sharma and Dr. N. Shrivastava, who motivated him time to time for pursuing this work.

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Finally, a sense of gratitude may be expressed to Dr. S. P. Ahluwalia, Professor and Dean, Faculty of Education, University of Saugor, Sagar (M P.) who very generously agreed to write the valuable foreword for this book.

SAGAR

The Author

10th March, 1986

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CHAPTER 1

Theoretical Framework

Introduction

Communication begins without a word and throughout life unspoken meanings are expressed in numerous ways. When children are too young to catch the meaning of words, they can understand the way a parent expresses emotion. They recognize the tilt of the head, a frown and a smile. They interact with the sounds of words and are also able to understand a tone of voice. The little child has the ability to recognize the prevailing attitude of his home-whether it is tense and hostile or happy and relaxed. He feels the shifting moods of the persons surrounding him, he is conscious of seriousness, mirth, calmness and gloom.

Language is used in many ways. There is the language of the eye and the language of the ear. The two may be independent or inter-dependent. The ear apprehends directly while the eye language is consisted of gestures, either facial expressions or bodily movement, mechanical movement of machines and written symbols of various kinds.

Both Piaget (1947) and Bruner (1964) have argued that the representation of information by means of abstract symbols, such as words, is a relatively advanced type of representation. Piaget calls the developmentally earlier type of representation as imagistic representation. The important distinction between imagistic representation and the more advanced form is its non-verbal quality. This presumed developmental change in representational ability indicates toward the possibility of developmental changes in the ability to use various types of stimulus cues. For instance, the ability to use nonverbal stimuli, such as colour and form, as a basis for representation may precede the ability to use verbal stimuli such as words.

Since nonverbal communication is so basic and definitely old as mankind, why the recent interest in its role in teaching and edu-

cation? Are teachers now expected to discover the hidden meanings behind everything that happens in the classroom situations? Is it necessary to become overly sensitive to ordinary behaviour? Not at all. Certainly, the teachers are not required to search meanings that lurk in the subterranean coverns of the mind. Simply, the goal is to become more conscious of nonverbal cues because they operate as a silent language in the classroom interaction. And it is through this classroom interaction that the business of teaching and learning goes forward.

Concept of Nonverbal Classroom Interaction

One day, an elementary-grade teacher was getting dressed for school, she hesitated between a simple suit and a bright multi-coloured dress. Choosing the coloured dress, she thought, "It will keep happy myself and the children." And, the whole of the day passed well. On another occasion, a teacher gave an arithmetical problem to solve for the class. While supervising the class, he noticed a student scowling at his note-book and biting his lip and ultimately moved to guide him.

What happened with these teachers? Each one either sent or received a message without hearing or saying a word. What happened was nonverbal communication? According to C. M. Galloway (1971):

"Nonverbal communication is behaviour that conveys meaning without words. It can be symbolic or non-symbolic, spontaneous or managed. It can be expressive, transmitting emotion; or it can be informative, transmitting facts. It can be specific as a gesture or as general as the atmosphere of a room. It can be either dynamic or static."

Galloway (1971) further comments, "Nonverbal communication takes a certain amount of time and occurs at a certain tempo. It can be quick or slow. It can be negative or positive—something that does. Or it can be a combination of any of these and there is even a nonverbal component in verbalism."

All the persons are compelled to send and receive messages. They try continuously to get information which minimizes doubt or facilitates understanding. When informations are communicated by words, the participants are conscious of hearing or saying the words. But nonverbal communication is given much less consciousness. The operations of imparting information through nonverbal action and

reading the meaning of another person's nonverbal behaviour usually occur without any deliberate action. Thus, nonverbal cues are evident in any situation where people are with other people.

Nonverbal behaviour consists of facial expressions, gestures, postures, vocal pauses, position in the classroom, movement and like that, by which teachers influence students much more than they express with words. It also involves use of the body, use of space and even the use of time. Although we are unaware of the process, we are very conscious of the eloquence of nonverbal cues. We also accept that "actions speak louder than words," and realize that how we say semething can be as important as what we say. For instance, teachers frequently use words such as "good" or "nice" but thispraise may prove false or unbelievable. This is due to contradiction between what is said and how it is said and such behaviours are called incongrucus behaviours. If the teacher wants to establish better classroom environment, he must be careful to avoid such incongruity. When there is an incongruity between verbal behaviour and nonverbal behaviour, then it is nonverbal behaviour that has the more lasting and more believable impression. Thus, when teachers are not honest and truthful with students, it is the nonverbal clues. that trip them up.

Teachers are not the only ones using nonverbal behaviours toconvey and receive messages in the classroom. The students readvery minutely each gesture and glance of their teachers. Even the
very youngest student will tell when asked, "Who is your teacher's
pet? Is he afraid of the principal? Does he like girls more than
boys?" The students know these answers because they read attitudes
by observing nonverbal cues. Therefore, nonverbal communication
is so much a part of what is happening in the classroom and it
should be and is assuming a greater importance in the teacher-training and other areas of education.

Nonverbal Feedback

Modifying nonverbal teacher behaviour is not easy, yet such an attempt should be an important part of any teacher preparation program me. The simple way to begin is to develop an attitude of openness. The steps for becoming better communicator involve awareness, understanding and acceptance. To be aware means to be open to the nonverbal reactions of others and oneself. To understand implies the task to analyse the meaning of observation and to suspend judgement untill one is rationally definite of the real mean-

ing of the behaviour. To accept means to acknowledge that one's behaviour means what it does to students and not what one intended to imply. This last step is somewhat difficult as most of us do not admitt that other percieve us differently. But once one can accept what one's behaviour represents or means to others, the door is open for the modification of behaviour through nonverbal feed-

Nonverbal behaviour represent the affective elements of the teaching-learning process and it is necessary to modify the nonverbal teacher behaviour in the right direction. But, there arise some issues regarding nonverbal feedback. Can our knowledge of nonverbal communication be used to improve teacher-student dialogue? The answer is yes. We can develop nonverbal skills. Some educationists have theorized that sensitivity to nonverbal clues is a function of a general sensitivity to a wide variety of behaviours. It means, those who are sensitive to clues in other areas will be sensi-

The second issue is, if nonverbal behaviour improvement is possible, what materials and methods should be used? The answer to this issue is that such a programme may include four types of activities: (1) to develop a theoretical base to know the meaning and importance of various types of nonverbal signs and signals by providing an in-depth exposure to literature and lectures; (2) to give opportunity to concentrate on literature that provide an in-depth treatment to a specific area of nonverbal behaviour-like facial expressions or spatial relationships; (3) to to participate actively in nonverbal experiences; and (4) to provide participatory training through on-the-spot observations and films rather than still photographs. This last activity is more important from the view point of providing live-experiences or experiences in situ. The video tapes and films may be utilized in sensitizing teacher trainees to nonverbal clues.

Nonverbal Interaction Research

Nonverbal communication is a relatively neglected area in educational research, although a lot of work has been conducted in the fields of anthropology, sociology, psychology and psychiatry. The importance of nonverbal communication may be noted by citing the findings of Mehrabian (1968) while measuring verbal and vocal language modalities and combining these channels with the facial non-language modality, found that the total message was 55 percent

facial, 38 percent vocal and only 7 percent verbal. Besides this, now-a-days the assumption that the cognitive and the affective domains are not separate entities but are the areas that interact according to the context of the situation is geting due place in the field of education in general and teacher behaviour in particular.

Actually, the nonverbal component of communication was all but ignored untill Charles M. Galloway (1962) applied this concept to education. Since then a number of studies have been conducted on various aspects of nonverbal classroom interaction in foreign countries. French (1968) in his study concluded that nonverbal behaviour data do provide descriptions of classroom activities which facilitate analysis of communication events and teacher influence. London (1975) in a comparative study of black and white observer perceptions of verbal and nonverbal behaviour of black and white teachers in schools for adjudicated delinquents inferred that raters heared the same verbal communication as indicated by I/D ratio (Indirect-Direct verbal behaviour ratio) but did not see the same nonverbal cues as indicated by E/R ratio (Encouraging-Restricting nonverbal behaviour ratio). He pointed out toward the implication of the study that teachers should be trained to become more sensitive to verbal and nonverbal behaviours of individuals whose cultural and ethnic backgrounds are different.

Sex Variable

A number of studies have been conducted to analyse verbal and/or nonverbal communication patterns Cosper (1970) compared sex differences in teacher-student interaction and found that female teachers of the fifth and the sixth grade gifted students initiated significantly more with male than with female students, female teachers tended to exhibit more restricting nonverbal behaviour toward female than toward male students, and female teachers exhibited more indirect than direct verbal behaviour and more encouraging than restricting nonverbal behaviour cues toward both male and female students. Shepard (1971) found that more nonverbal behaviours were directed to boys than to girls and female teachers exhibited a greater percentages of encouraging behaviours to the upper-social class that did male teachers. Fowler (1972) found that female elementary teachers and female secondary teachers were found to be significantly more restricting nonverbal in their adult basic education (ABE) classes than in their regular public school classrooms. Crump (1974) inferred that male teachers were significantly more encouraging nonverbally and more indirect verbally toward female than toward male students. Although female teachers are more indirect verbally toward male students than toward female students, they were more encouraging nonverbally towards female students than toward male students. Rankin (1975) in the area of physical education found significant difference i.e., female teachers used gestures more than their male counterparts. Twa (1979) found that male teachers had a significantly higher level of confusion than the female teachers.

Grade level, teaching experience and other variables

The grade level, teaching experience and types of teachers have also been studied as variables in different studies. Shepard(1971) found that experienced teachers, exhibited a greater percentage of encouraging behaviours to the upper social-class than inexperienced teachers, and inexperienced teachers were more restricting in their nonverbal behaviours than were experienced teachers. Zamora (1974) using Affective Behaviours of Townsend's (1967) system for coding interaction with multiple phases (SCIMP) found that comparison of subjects with "more" and "less" years teaching exprience show two significant differences including more use of "positive touch" and less use of "void" behaviours by teachers with more teaching experience. Twa (1979) found that there was significantly m ore student frowning in the intermediate level than at the primary level. Hankin (1975) found distinct patterns of verbal and nonverbal behaviour in number and nature of verbal and nonverbal behaviours exhibited to students in two classroom settings i.e., a traditional and an open-space setting. Frances(1977) concluded that there are significant differences in verbal and nonverbal communication patterns in best and not best teachers. Fullertone (1978) found that regular teachers were extremely encouraging nonverbally toward main-streamed educable mentally retarded (EMR) students in their classroom while they were extremely indirect verbally toward regular students giving them greater freedom to respond verbally.

Different Types of Nonverbal Acts

Some studies have been conducted establishing relationship of verbal and nonverbal behaviours with a number of nonverbal actiquality and attitude toward teaching. He also explored significant

correlation between (i) mouth movement and head movement, (ii) mouth movement and vocal quality, (iii) head movement and haptics, and (iv) proxemics and haptics. Phillips (1975) found significant relationship between scores on PONS (Profile of Nonverbal Sensitivity developed by Robert Rosenthal et. al.) and nonverbal behaviour (E/R ratio) of IDER. Willet (1976) by factors analysis of semantic scales found five factor describing nonverbal activity which were pleasantness, responsiveness, dominance, importance and autonomy. He inferred that effective teachers (ET's) perceived themselves more favourably higher than their students on each of five factors while the average teachers rated themselves lower than their students on three factors of teachers nonverbal activity.

Self-concept, teacher warmth, teaching effectiveness

Dean (1976) studied the relationship between self-concepts, nonverbal behaviours and teaching effectiveness in prospective secondary teachers and found no significant relationship between the male's self-criticism scores as well as female's self-criticism scores and their nonverbal behaviours. Shaffmaster (1976) obtained significant positive correlation between supportive verbal and nonverbal teacher behaviour and prosocial child responses and between restrictive verbal and nonverbal teacher behaviour and antisocial child responses. Galfner (1976) concluded that students perceived teacher warmth primarily through nonverbal channels of communication. Thomas (1980) found significant difference in the category of verbal and nonverbal praise and acceptance between the physical education teachers with high self-perception scores and low self-perception scores. Brown (1982) designed a study to investigate the varying dynamics of the verbal and nonverbal classroom control techniques to various problem situations, with respect to sex, subject and type of secondary school. The findings revealed significant differences between junior and senior high school teachers, and male and female teachers, and also among secondary school teachers of various subjects. O'Connor (1982) tried to determine whether or not there was a significant difference in the verbal and nonverbal behaviour of the most effective teacher. The results indicated a significant difference in the "praises" and "asks questions" category for the most effective teacher. The most effective teacher spent 50 percent less time in the "directing" and "criticizing" teacher talk categories, and the less effective teacher used significantly more "body movement" than the other teachers.

Experimental Studies

Some studies have been conducted to see the effects of various types of nonverbal behaviours in various situations. Kaufman (1975) studied the effects of nonverbal behaviour of an instructor on performance and attitude in the college classroom and noted the significant results. Williams (1977) tried to study the effects of nonverbal communication classroom climate and concluded that eye-contact was perceived as threatening and embarrasing due to established associations with the intent of teachers' gaze and tactility was not desired while proxemity was perceived as showing interest in student welfare. Rosen (1978) concluded that the use of two teaching procedures (techniques of modeling and instructions) was found to be highly effective method for teaching nonverbal empathy behaviours i.e., eye-contact, body orientation and forward lean.

Personality Variables

A few studies have concentrated on some personality variables like self-concept, attitude, anxiety, etc. Quesnell (1978) concluded that the training of primary grade children in the skills of encoding and decoding the communicative aspects of nonverbal behaviour did seem to promote an increase in positive self-concept. Langenbahn (1978) studied the use of Nonverbal Awareness Activities and their effects upon a group of adolescent males and females in the development of more positive attitude towards their bodies and found moderate positive relationship. Drake (1980) in his study supported the belief that the teaching of nonverbal communication signals impacts significantly on self-esteem level, anxiety level and locus of control orientation in positive direction. Effect of Nonverbal Awareness

Some investigations were conducted to study the influence of nonverbal awareness on the part of the teachers and reported the contrasting results. A few studies showed the significant difference while others showed no significant difference. Stankus (1977) trained an experimental group of student-teachers in Flanders Interaction Analysis Technique (FIAT) and nonverbal awareness and found that trained group did not demonstrate significantly more encouraging nonverbal behaviours than untrained group. Dunn (1978) also attempted to study the effects of instruction in verbal and nonverbal interaction analysis and microteaching on the verbal and nonverbal teaching behaviours of selected Home Economics Student-Teachers but found no significant difference between experimental and control

groups. Huntley (1978) conducted a study to determine the effect of nonverbal behaviour awareness training on the perception and performance of student-teachers in elementary and secondary education but found no significant effect. Docteur (1979) examined the effects of variations in teacher verbal and nonverbal contingent reprimands on student inattentive behaviours and found that after training with both verbal and nonverbal components, students returned to on-task behaviour and did not demonstrate a tendency to return to either off-task or disruptive behaviour. Garret (1979) conducted an experiment to determine if student-teachers participating in a nonverbal communication training programme would be perceived more positively by pupils than student-teachers not participating in programme and found the significant difference between experimental and control group. Crawford (1980) determined the changes in teacher behaviour during the course of a Special Emphasis Reading Project and noted the significant decrease in restricting nonverbal behaviour, significant decrease in direct verbal behaviour and significant increase in student talk.

Nonverbal Interaction Analysis As Feedback Device

Beisner (1977) used split-screen audio-video recording and systematized self-analysis as a feedback device to improve the verbal and nonverbal behaviours of teachers and found significant difference between experimental and control groups at '05 level of significance. Fetter (1981) obtained a significant difference in the nonverbal teaching behaviour of school health educators who utilized a systematized self-analysis.

Student Nonverbal Cues

Brown (1983) attempted to determine if significant differences exist among learning disabled, normal and gifted students at primary and intermediate-age levels in the ability to recognize nonverbal cues. The findings indicated (1) gifted students did not score significantly higher than normal students on the total score. (2) No significant interactions were observed among groups and age levels, however, main effects were observed for each variable. (3) The learning disabled students scored significantly lower than gifted and normal students on all variables (positive, negative, face, body, and visual cues) except auditory. The intermediate-age level scored significantly higher than the primary level on all nonverbal cues.

Smith (1983) tried to observe and interpret selected nonverbal behaviours of children with adults of two different ages: over 70 years old and under 25. Two-way analysis of variance revealed significant differences in three behaviours when children were with a young or old adult. Participants had more automanipulative behaviours with the older adult. There were more head shake and head nod behaviours with the younger adult.

Administrator Nonverbal Behaviour

Rhea (1984) researched the concept of administrator-teacher nonverbal communication and determined whether there existed differences among the nonverbal behaviour of principals at the different education level as percieved by teachers. He found no significant differences and recommended that further study should be made to study the significant differences between the nonverbal behaviours of "effective" and "non-effective" principals.

Cross-cultural Nonverbal Research

Machida (1983) examined the degree to which teachers can accurately decode nonverbal indicants of comprehension and non-comprehension in young children and the results were found satisfactory. Ethnicity of the teacher was a critical factor in accurate assessment of the children's understanding. Mexican-American teachers seem to be more proficient than Anglo teachers in detecting levels of comprehension using the children's nonverbal cues. Teachers percieved boys as understanding more than girls, particularly in the Anglo and Limited Bilingual group. Although cultural difference were present in children's nonverbal behaviour, it did not appear that the behaviour was misinterpreted by either groups.

Nonverbal Observation Systems

The search for the devices for measuring nonverbal behaviour has also been made. Many category systems for observation of teacher behaviour were analysed by Openshaw and Cyphert (1966) in order to design and develop a synthesis of the systems for their own four dimensional category system, which they named a taxonomy of teacher behaviour. This system may be called as multi-dimensional because it is both cognitively and affectively oriented. Verbal and nonverbal kinds of communication are recorded. The subject of the observation is the teacher and the methods of encoding data are both live and videotape. This system has been used in research but not for teacher training.

In the revised, 1970, two-volume series on observations, titled "Mirrors For Behaviour" edited by Anita Simon and A.G. Boyer, 700 references dealing with observation of teacher and student behaviour have been reported. Currently, a new thrust of using the video-tape techniques in assessing nonverbal behaviour patterns of classroom teachers is being tried out. The "Second Handbook of Research on Teaching" edited by R.M.W. Travers (19⁻³) provides a comprehensive overview of how observations are used to study teaching and assess teacher competencies.

French and Galloway (1968) developed an IDER (Indirect-Direct-Encouraging-Restricting) system of observation, which measures the verbal behaviour of teachers and students both and the nonverbal behaviour of teachers only. The IDER system was an attempt to match the 10 verbal categories of Flanders' interaction analysis with encouraging and restricting nonverbal dimensions. Leo (1969) developed a category system to quantify teacher affective nonverbal behaviour. The categories were bipolar opposites in areas of teachers nonverbal praise/rebuke; Teacher nonverbal substantive and procedural help/teacher unawareness of student needs for substantive and procedural help; Teacher nonverbal behaviour controlling/teacher unawareness of student needs for behavioural limits. He concluded the category system to have high reliability. Dodge (1969) also attempted to devise, test and validate an instrument for assessing teacher's nonverbal interaction patterns and inferred that availability of verbal, nonverbal and interrelation of verbal and nonverbal factors increased the teachers' potential to improve affective communication. Heger (1969) under the guidance of Galloway developed the Mini TIA (Miniaturized Total Interaction Analysis) system, which was found to be an operational tool that broadens and extends the power of existing tools. This system successfully provides a balanced, reciprocal perspective of both verbal and nonverbal communication events. B. M. Grant (1969) developed a category system to analyse teacher nonverbal activity. This system was a composite, multi-faced disign that made possible the analysis of data in a systematic, detailed way, within a unified framework and with considerable accuracy. The system involved the four basic concepts - the concept of nonverbal teaching roles, the concept of physical motions, the concept of "move" types and the concept of move patterns. The results of the system indicated a consistently high degree of reliability (80 to 100) for all categories of analysis.

P. Amidon (1971) developed a Nonverbal Interaction Analysis (NVIA) technique which provides a method of recording nonverbal behaviour in the classroom. It is designed to parallel the verbal categories of Flanders' Interaction Analysis and capable of accomodating the 80 expanded IA categories. It codes the four classroom dimensions, each of which affects teacher/pupil interaction: (1) Room arrangement (2) Materials (3) Nonverbal Behaviour, and (4) Activities. The First and second dimensions are related with classroom setting—the physical arrangement of desks, chairs, bulletin boards, and the presence or absence of certain materials, supplies and equipment. The third dimension is concerned with the teacher's nonverbal behaviour - facial expressions, gestures, postures and so on. The fourth dimension combine the previous 3 by focussing on the use of materials by the teacher and the pupils, in conjunction with nonverbal behaviours. Linn (1976) developed a Nonverbal Behaviour Category System (NBCS) to assess teacher nonverbal behaviour that occurs during classroom teaching. In its method, a nominal notation system for recording events was used and data was compiled in a 10 × 10 matrix for each recording session. He inferred that nonverbal teacher behaviour differs over situations and this system could be used by teachers to view video-tapes and themselves to assess their nonverbal behaviour or could be used by supervisors to help teachers in identifying their nonverbal behaviour. Roshong (1978) intended to develop an observational instrument to study nonverbal behaviour of instrumental music conductors and to see if relationship exist between the observed nonverbal behaviour and the nature of the task being performed. This system consists of six categories with accompanying subcategories. The intensity of each behaviour is noted on a Five point rating scale. This instrument is a viable means of recording both the type and quality of the subjects' nonverbal behaviour that occurred during the video-taped

A few observational systems have been developed related to physical education setting. Rankin (1975) developed RIAS (The Rankin Interaction Analysis System) to collect the verbal and non-verbal interaction that took place during the teaching experience of the student-teachers and students in elementary physical education. There were five verbal and five nonverbal categories as follows:

(1) Teacher talk (2) Teacher rejection (3) Student talk (4) Student feedback (5) Teacher praise (6) Student smiling (7) Student moving (8) Student frowning (9) Teacher gestures (10) Non-response or

confusion. Catell (1979) tried to develop and validate a reliable system for classifying and analysing teacher behaviour in a physical education setting with special reference to teaching of skillfull performance in sports. The behaviour categories were derived primarily from concepts selected from the fields of educational philosophy, motor learning and study of teaching. This tool focussed on types of sport-related topics dealt with by teacher and types of verbal and nonverbal moves made by teacher. Its reliability was reported to be '8). Grastorf (1980) attempted to explore and identify selected observable nonverbal behaviour of collegiate female varsity volleyball and basketball coaches in practice and game situations as recalled by athletes and coaches. The Nonverbal Behaviour Description Questionnaire (NBDQ) was developed which consists of 30 nonverbal behaviours. It was found that the nonverbal behaviour on the NBDQ can be recalled and described by female volleyball and basketball coaches and athletes in practice and game situations

E. Wayne Roberson (1970) developed the Teacher Self-Appraisal observation system for the use of teachers in modifying their behaviour. It consisted of three dimensions of teacher behaviour: methods, objectives and expressions. The TSA system was constructed on the assumption that every teacher in the classroom has some desired outcomes (objectives), that he will choose some means (methods) to achieve the objectives, and that, the way he expresses himself verbally and nonverbally will greatly influence his teaching effectiveness. The system contains nine possible methods to be selected, nine levels of objectives to be achieved, and seven levels of verbal and nonverbal expressions to be utilized. When coding the tape, the teacher sits with TSA cards. As the video-tape is replayed a been will sound every ten seconds. Each time a been is heard the teacher stops the video-tape and marks: (1) teacher method, (2) teacher desired student affective behaviour, (3) teacher-intended student cognitive behaviour, (4) teacher verbal expression, (5) teacher nonverbal expression. Now this TSA card is computer processed to provide feedback in order to compare between the planned and the actual performance. The computer provide the teacher with: (1) the amount of time spent in various methods, (2) the amount of student participation, (3) the number of cognitive responses of students and (4) the percentage of encouraging, routine and inhibiting expressions he displayed.

Lary R. Parker (1970) made a first attempt to observe student behaviour in the classroom. The outcome was a Student Behaviour Index (SBI) which encode "self-directive" and "complaint" student behaviours and record "Indirect" or "Direct" teacher behaviour. The SBI focusses on a single student's verbal and nonverbal behaviour simultaneously with any teacher behaviour verbal and nonverbal, which interacts with the observed student. Self-directive student behaviour are; (1) Directs talk to the teacher, (2) Makes the selfinitiated nonverbal behaviour, (3) Direct talk to peers, (4) Respond to peers. Complaint student behaviour are: (5) Works reading and written assignments, (6) Makes verbal reply to teacher, and (7) Listens-follows directions in nonverbal behaviour. The 8th category is the Direct teacher behaviour, which includes lecturing, giving directions, criticizing or restricting nonverbal behaviour. The 9th category is Indirect teacher behaviour including accepts feelings, praises, uses students' ideas, asks questions or encouraging nonverbal behaviour. The last is the 10th category of confusion and miscellaneous.

In India, Centre of Advanced Studies in Education (CASE), Baroda has been pioneer in the area of teacher behaviour using systematic observation as a research technique. The Department of Education, Meerut University has been a place for such type of studies. The NCERT, New Delhi; Regional College of Education, Ajmer; Banglore University; G. T. T. College, Jabalpur; and other universities have also contributed in this field. A few of the studies like that of Santhanam (1972), Maheshwari (1976), Nayar (1976) and Goel (1978) investigated the verbal interaction patterns for teachers of different types of subjects, effective and ineffective teachers, and extrovert and introvert teachers. The variables studied were age, sex, recency of training and marital status. Quraishi (1972), Patel (1974), Singh (1974), Mathew (1976), Mehta (1976), Malhotra (1976), Shashikala (1978) and A. Singh (1978) tried to investigate the relationship between the classroom verbal behaviour and number of variables like personality, attitude, motivation, classroom organization, creativity, self-concept, age, sex. recency of training, teaching experience, different types of climate, socio economic status and modernity. Some studies like that of Jangira (1972), Vashistha (1976), Raijiwala (1976), Roka (1976), Desai (1977) and Pevanasam (1977) have been conducted for modifying teacher behaviour using verbal interaction analysis as a feedback device. Pangotra (1972),

Roy (1970) and L. P. Singh (1974) compared the effectiveness of various feedback devices. Sharma (1972) and Padma (1976) studied the effect of different teaching patterns of the cognitive attainment of pupils. Shaida (1976) investigated the effect of questioning and feedback on pupil attainment. Pillay (1978) attempted to explore the effect of creative teaching method on general creative thinking. As regards the development of observation systems, Indian researchers have rarely attempted to develop a tool of their own to quantify classroom communication. Tools developed by Jangira (1971), Sharma and Vaidya (1973), Verma and Ansari (1975), Deva (1978), and Vashistha and Agarwal (1979) are worth-mentioning. (K. K. Vashistha, 1981), Jain (1983) has also developed an observation system to measure student's moral behaviour which is more nonverbal than verbal in nature.

A glance on relevant literature suggests that almost all the studies delimit themselves only to verbal aspect of teacher behaviour in India, not touching the nonverbal aspect of teacher behaviour. There is an urgent need to study the nonverbal classroom behaviour to understand the nature of teaching and for the modification of behaviour. Similarly, the development of tools for classroom interaction analysis with provision for cognitive and psychomotor behaviour and also for nonverbal behaviours appear yet to be done in India (Vashistha, 1982). Thus, the lack of research on nonverbal classroom interaction particularly in India was the main source of the problem.

Problem of the Study

Though a number of innovations have come in light in teacher education programmes, but even then, the traditional way of practice teaching is continuing in the training colleges. It is the personal experience as teacher educator that during the supervision of practice teaching lessons the supervisory comments are given at the last page of the lesson plans. These comments are mostly related with teaching methods, teaching devices, content-matter, use of teaching aids, teacher's voice, black-board writing, black-board summary, questioning and other aspects which are the results of three or five minutes of observation of class. No teacher educator acquaints the student-teachers about their over-all classroom behaviour and all these comments and suggestions are confined to the verbal teacher behaviour. Hardly any remark is given on nonverbal teacher behaviour, although sometimes and actually, most of the time nonverbal beha-

viour is more important. Two teachers may say the same thing but how they are saying? It is this which makes the difference between the two teachers. It is the nonverbal behaviour which goes all the way with the verbal behaviour and signifies the verbal behaviour.

The classroom behaviour of teachers is determined by a number of factors. A number of factors may be accounted for teacher characteristics attitude, aptitude, academic abilities, skill, grade level, teaching methods and teaching subjects. The classroom behaviour of teachers vary in case of different type of subjects. A few investigations are available of factors which affect the educational situation and determine specific activities and interactions. Some of the studies have been conducted on classroom verbal behaviour in relation to grade, subject, sex, qualifications and age of the teachers by using Flander's Interaction category system. But no study has been designed on classroom nonverbal behaviour. This lack of investigation on nonverbal behaviour indicates the need for a concerted efforts in this area of teacher education.

Some studies bave been conducted on classroom behaviour of teachers in relation to different subject matters and these too, are limited only to verbal behaviour. But no study has been designed on classroom nonverbal behaviour in relation to different subjects in a wide perspective. The following are the main questions in this regard:

- -What type of nonverbal interaction patterns are possessed by teachers of different subjects?
- —In what manner male and female teachers differ in nonverbal interaction in relation to subject?

The investigator has made an attempt to seek the answers of these questions. Therefore, the study has compared the classroom nonverbal interaction patterns of language, social studies and science teachers.

Objectives

The present study was undertaken to achieve the following objectives:

- -to compare nonverbal interaction patterns of language, social studies and science teachers.
- -to compare nonverbal interaction patterns of male and female teachers.

Hypotheses

Under the plan and procedure of the study the following hypotheses were formulated and tested:

-There is significant difference in verbal and non-verbal interaction patterns of language, social studies, and science teachers.

The above hypothesis is based on a study entitled, "Teachers Characteristics" conducted by D. G. Ryans, suggests that in the secondary school the pattern of characteristics is not the same for teachers of different subject matter.

Another study conducted by Santhanam (1972) may be the basis for the hypothesis that the teachers differ in their influence patterns when the subject matter taught by them is altered.

—The male teachers differ significantly with that of female teachers in using verbal and non-verbal interaction patterns.

The above hypothesis is based on the study of Santhanam (1972). He found that women teachers are more indirect in their influence than men teachers.

Another study conducted by Rankin (1975) may be the basis for above hypothesis. He found significant difference i.e., female teachers used gestures more than their male counterparts.

- -The amount of direct verbal behaviour has significant relationship with the amount of restricting non-verbal behaviour.
- The amount of indirect verbal behaviour has significant relationship with the amount of encouraging non-verbal behaviour.
- -There is significant difference in the following ratios of language, social studies and science teachers:
 - (1) I/D ratio (2) revised I/D ratio (3) E/R ratio (4) S/T ratio.

Assumptions of the Study

The following are the assumptions of the study:

- 1. Although communication has been variously defined, atleast two important dimensions exist: verbal and nonverbal (Achilles and French, 1977).
- 2. Teacher congruency between verbal and nonverbal communication cues is important. Incongruency between verbal and

nonverbal cues means a varying degree of dependence on the nonverbal cue (Achilles and French, 1977).

- Classroom verbal and nonverbal behaviour of the teacher can be observed objectively. The observation of verbal and nonverbal teacher behaviour through Galloway's IDER system of observation has high reliability and can be quantified for various purposes. In this study, the observation of teachers was made through IDER system.
- It has always been recognized that the teacher exert a great 4. deal of influence on the pupils. Only recently it has been shown that the most important aspects of teacher behaviour as far as the influence on the pupils is concerned, is his classroom behaviour (Flanders, 1960, 62). 5.
- There is no single pattern of teaching that should be adopted by all teachers. Each teacher must discover for himself his own unique over-all balance among verbal-indirectness, verbaldirectness, nonverbal-encouragement and nonverbal-restrictive-6.
- Fear of supervisors evaluation must be eliminated, while observing the class in order the teacher will feel free to diagnose

Rationale

Nonverbal cues either reinforce or minimize verbal message. They become the point of attention and carry conviction that lingers long after the verbal event has passed. Why this is so is not possible to answer, but the strong influence of non-verbal cues is unmistakable (C. M. Galloway, 1971).

To obtain more clear meaning, the hearer requires the combination of both verbal and non-verbal communication (G. A. Boyd,

In the area of non-verbal behaviour, Torrance found that even though teachers verbalize certain beliefs or attitudes their non-verbal expressions may betray their real feelings which adversely affect the behaviour of pupils. Davidson and Long concluded that a teacher's feelings and attitudes are expressed both verbally and non-verbally to the child. Bernstein found that children from the lower working class depend more on the non-verbal expression and teachers to detect meaning in school situations 1970). (E.W. Roberson et.al.,

David A. Corsini (1972) in his study "to examine developmental changes (Pre-school and second grade subjects) in the ability to form a memory code, independent of spatial arrangements, as a function of verbal and non-verbal stimulus cues", found that when superior performance by maintenance of attention and coding of spatial position was eliminated, the pre-school subjects still performed significantly better when both verbal and non-verbal cues were present than when only verbal cues were present.

Descriptive research on teaching has concentrated primarily on verbal communication between teachers and students. Little attention has been given to non-verbal actions of classroom participants. Increasingly, researchers have noted limitations of their work in classroom interaction when ignoring non-verbal phenomena and have recommended research that incorporates non-verbal and verbal behaviours (John Samuel Caputo, 1977).

Delimitations

In the present study, subject and sex were the independent variables, the comparison of which were to be made, and verbal and non-verbal interaction patterns were dependent variables by which the effectiveness of independent variable was to be ascertained. But, there are a number of factors like age, aptitude, attitude, academic qualifications, experience of teaching, rural and urban background, socio-economic status which may influence the dependent variables (the verbal and non-verbal interaction patterns for teachers of different subjects). These may be called constants. The present investigation has not taken into account these constants. Thus, the present investigation was delimited with regard to subject and sex only assuming other factors as constants.

The study was delimited to language, social studies and science student teachers only.

The study was also delimited with regard to methodology, sampling and tool. It has been confined to secondary level. The observation method was used in this study.

The sample consisted of 299 teachers only, because it was not practicable to encode the behaviour pattern of a large sample.

Another delimitation was in the use of Galloway and French verbal and non-verbal interaction analysis technique, though other systems of observation were also available.

CHAPTER 2

Design of Research

The normative observation survey method was used for this study. The investigator used the Galloway's system of observation, because it does not require costly electrical and electronic equipments for use in the process of observation and subsequent analysis which might be essential with respect to some other tools of observation.

Sampling

The accuracy and precision of the generalizations depend upon the representativeness of the sample. Therefore, the probability sample was taken in the present study. The population for the present study was defined as student-teachers of B. Ed. training colleges of Rajasthan University. The unit of study was student-teacher and it was not convenient to study all the student-teachers. Therefore, a representative sample was taken. In this study, 299 student-teachers constituted the sample which was flexible, practical and economical to study on the part of the investigator. The cluster random technique was employed to construct the sample. The researcher selected six training colleges of Rajasthan University. The selection was based on the assumption that it might be a true representative of the population.

The sample was analysed with regard to age so as to understand the composition of the sample, which has been presented in Table 2 1. The table shows that the age of the sample ranged from 18 to 37 years. Majority of the student-teachers fell between 18 to 25 years. It seems that the sample was representative of student-teachers with regard to age.

The sample was also analysed with regard to academic qualifications which has been provided in Table 2.2. It may be observed from Table 2.2 that 68 per cent male language and 51 per cent female

language teachers were post-graduates, while 32 per cent male language and 49 per cent female language teachers were graduates. On the other hand, 66 per cent male social studies and 62 per cent female social studies teachers were post-graduates whereas 34 per cent male social studies and 38 per cent female social studies teachers were graduates. It is also shown from the table that 34 per cent male science and 30 per cent female science teachers were post-graduates while 66 per cent male science and 70 per cent female science teachers were graduates. The proportion of male and female groups seems to be similar in nature.

The scrutiny of the tables 2·1 and 2 2 reveals that the composition of the sample regarding various factors was fairly representative. The other considerations kept in view for selecting the sample were as follows:

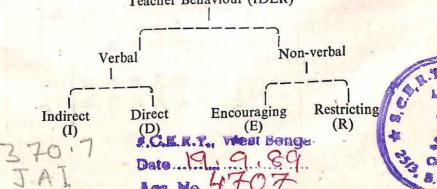
- That the sample consisted of Hindi, English, Sanskrit, History, Civics, Social-studies, Economics, Geography, Biology, Mathematics and General Science Teachers.
- The subjects were from different socio-economic strata.
- They belonged to rural and urban areas.
- The sample consisted of both male and female teachers.

Galloway-French Observation System

The observation instrument is French-Galloway adaptation of the Flander's Interaction Analysis Category System called Indirect-Direct, Encouraging-Restricting (IDER) which considered both the combined verbal and non-verbal as well as the non-verbal dimensions of classroom interaction. The forty-category system expanded the tenbasic categories of Flander's System for Interaction Analysis into:

- (1) Encouraging or Restricting verbal and non-verbal combined, and
- (2) Encouraging or Restricting non-verbal alone.

 Teacher Behaviour (IDER)



Sample Structure with Regard to Age

Age				Male Teachers					Fem	Female Teachers	Sir			70407
th	La	Language		Social studies	S	Science	La	Language	Soci	Social Studies		Science		Total
	1	%	7	1%	15	f %	- J	%	J	%	f	1%	7	%
34-37	7	4	3	9	c	9	3	9	3	9	1	7	11	4
30-33	B	9	7	4	3	9	1	7	2	4	4	6	12	4
26-29	B	9	4	8	Н	7	8	16	9	12	4	6	26	6
22-25	26	25	31	62	11	34	27	53	30	09	15	31	149	49
18-21	16	32	10	20	26	52	12	23	6	18	24	49	101	34
Total	50	100	50	50 100	50	100	51	100	50	100	48	100		
	2		150	0.	İ				149	6			299	100

TABLE 2.2

Sample Structure with Regard to Academic Qualifications

			Male Teachers	eachers					Female	Female Teachers	S			
Quali-	Lang	Language	i	Social Studies Science	Sci	ence	Language	lage	Social ,	Social Studies	1	Science	To	Total
cations	5	%	f	%	f	%	f %	%	f	%	f	f %	15	%
M. A.	34	89	33	99	1	r	26	51	31	62	I	1		
B. A.	16	32	17	34	1	1	25	49	19	38	1	1		
M.Sc.	1	1	1	1	17	34	1	1	1	1	14	30		
B. Sc.	1	1	1	I	33	99	1	Î	1	. 1	34	20		
	20	100	50 100	100	50	100	51	51 100	50	50 100	48 100	100		
Total			150	0	İ		l		149			1	299	299 100

If teachers are to become more effective in the classroom, they need to become attentive and aware not only to what they are communicating but also to how they are communicating. They need to understand the significance of their non-verbal behaviour what it means to others.

Although non-verbal behaviour often reflects their true feelings and attitudes, most teachers are not aware of what they are communicating non-verbally. They teach with little knowledge of their personal attitudes and how these affect teaching behaviour through non-verbal actions. Delving into the world of the non-verbal is an interesting experience. In the beginning, only the very obvious clues can be perceived and understood. However, as sensitivity to this kind of communication increases, things that were only vague feelings come into sharper focus.

Flander's Analysis provides information what is said, and Galloway's system deals with how things are said; they are used in combination.

Galloway has developed two categories for non-verbal communication to further describe each category of the Flander's analysis of verbal interaction.

With the exception of Flander's first category which does not require extension or qualification, there is one non-verbal category for use when the verbal encourages interaction and one non-verbal category for use when the verbal restricts interaction. This system does not cover all the kinds of non-verbal behaviour of the teacher, but it does give very useful and pertinent information in several important areas of teacher behaviour.

The combined verbal and non-verbal system is relatively easy to learn. For the person who knows the Flanders System there are no new numbers to learn. A summary of the combined system is presented in Table 2.3. The combined verbal and non-verbal system makes the resulting analysis more complex but easier to understand.

Description of the Flanders Interaction Categories

Flanders and others developed an observational system at the University of Minnesota between 1955 and 1960. The category system has many useful applications. Flanders attempts to categorize all the verbal behaviour to be found in the classroom. The system has two main sections, teacher talk and pupil talk. This division

Summary of Non-Verbal Interaction Analysis Categories (R. M. W. Travers, 1973) TABLE 2.3

Non-verbal (Galloway)	Restricting	11. Indifference	Congruent: Non-verbal cues rein- 12. In-congruent: Contradiction occurs force & clarify the credibility of a between verbal and non-verbal cues.	ie 13.	S		the class for consideration. Personal: face to face confron- 14. Impersonal: Avoidance of verbal Inter-	ice 15.	or direction of talk in response to ness to change the pace or direction of student behaviour, i. e., bored, unlecture disregarding pupil response and	receptive, disinterested or inattentive. cues. Involve: students are involved in a 16. Dismiss: teacher controls or dismisses	clarification or maintenance of students behaviour.	ns which evaluate a 17.	politely expectations for the situation. defensive benaviour.
	Encouraging	1. Acceptance	Congruent: No force & clarify	verbal message.	occurs when the	ing it, rejecting	the class for consideration Personal: face to face con	tions. Responsive: a	or direction of student behavi	receptive, disir	clarification	Firm : criticism situation clea	politely expect
		1.	2.		;		4	V		9	;	7.	
	Verbal (Flanders)	Accepts	feelings	Encourages	uses Ideas	or students	Asks	Questions	rectation	Sives	Directions	Criticisms or Justifies	Authority
	Ver	1		; 0	ń		4.	ų	·	4	0.	7.	

Non-verbal (Galloway)	Encouraging Restricting	of listening & involvement		10. Comfort: Silences character-ized by moments of reflection thought, or work.	tion and disorientation.
Verbal (Flanders)		Student-Talk: Response	Student-Talk: Initiation	Silence or Confusion	
Λ		∞ Student-	oi Talk	Silence	

makes total behaviour or total classroom interaction meaningful. A third major section, Silence or Confusion, covers other verbal behaviour, has been included in order to account for the time spent in behaviour other than that which can be classified as either teachertalk or pupil-talk. All statements that occur in the classroom, therefore are categorized in one of the three major sections (a) teacher talk, (b) pupil talk, and (c) silence or confusion. These three conditions are supposed to exhaust all possibilities so far as communication is concerned.

The larger sections of teacher and pupil-verbal behaviour are further classified in order to make the total pattern of teacher-pupil interaction more expressive. The first main section is classified into two-direct and indirect teacher talk. This classification gives main attention to the amount of freedom the teacher grants to the student. In a given situation, therefore, a teacher has a choice. He can be direct, thus, minimizing the freedom of student to respond, or he can be indirect, maximizing the freedom of the student to respond. His choice, conscious or unconscious, depends upon many factors, like his perception of the situations and the goals of the particular learning situations. The two subdivisions for teacher verbal behaviour, are further divided into more specific smaller categories. Indirect teacher behaviour or indirect influence consists of four verbal categories: (a) accepting feeling, (2) praising or encouroging, (3) using student's ideas, and (4) asking questions. Direct influence is divided into three categories: (5) lecturing (6) giving directions, and (7) criticizing or justifying authority. Hence, first seven categories are used when a teacher is talking. Pupil talk is classified into only two categories: (8) responding to teacher, and (9) initiating talk. Category 10 is usually referred to as silence or confusion. All categories are mutually exclusive, yet totally inclusive of all verbal behaviour occuring in the classroom.

The ten categories (Amidon and Hough, 1967) are detailed below:

TEACHER TALK

Indirect Teacher Behaviour

Category 1, Acceptance of Feeling. The teacher accepts feelings when he says that he understands the children's feelings, that they have the right to have these feelings, and that he will not mind and

punish the children for their feelings. These types of statements often communicate to children both clarification and acceptance of the feelings.

This category also includes the statements that recall past feeling, refer to enjoyable or uncomfortable feelings that are present, or predict happy or sad events that would occur in the future. Acceptance of emotions in the classroom is quite rare; probably because teachers find it difficult to accept students' negative emotional behaviour.

Category 2, Praise or Encourage nent. This category includes jokes that release tension, but not those that threaten students or are made at the expense of individual student. Often praise is a single word: "good", "fine", "yes" or "right". Encouragement is slightly different and includes statements such as, "continue", "Go ahead with what you are saying," "Uh huh; go on; tell us more about your views." "Sometimes the teacher simply says, "I like what you are doing."

Category 3, Using Ideas. This category is quite similar to category 1; however, it is related with only acceptance of student ideas, not acceptance of emotions. When a student makes a suggestion, the teacher may paraphrase the student's statement, restate the may also state "well, that's an interesting idea, I see what you mean."

Statements belonging to category 3 can be identified by asking the question, "Is the idea that the teacher is now stating the student's or is it the teacher's?" If it is the student's idea, only then this category is used but if it is the teacher's category 5 may be employed.

Category 4, Asking Questions. This category includes only questions to which the teacher expects an answer from the pupils. If a teacher puts a question and then follows it immediately with a statement of opinion, or if he begins lecturing, obviously the question was not intended to be answered. A rhetorical question is not considered as a question, and therefore, is not included in category 4.

Questions that are meant to be answered are of several kinds. These may be direct in the sense that there is a right or wrong

answer. All questions, however, broad or narrow which need answers and are not commands or criticisms, fall into category 4.

Direct Teacher Behaviour

Category 5, Lecturing. Lecture is the form of verbal interaction that is used to impart information, facts, opinions, or ideas to children. The presentation of material may be used to introduce, review, or focus the attention of the class on an important topic. Usually information in the form of a lecture is conveyed in fairly extended time periods, but it may be interspersed with children's comments, questions, praise and encouragement.

Whenever the teacher is explaining, discussing giving opinion, or giving facts or information, category 5 is marked. Rhetorical questions are also included in this category. Category 5 is one most frequently tallied in classroom observation.

Category 6. Giving directions. The decision about whether or not to categorize the statement as a direction or command must be based on the degree of freedom that the student has in response to teacher direction, When the teacher says, "Will all of you stand up and stretch?" He is obviously giving a direction. If he asks a student, "go to the board and write your name," he is giving a direction or command. When he enquires to a particular pupil, "I want you to tell me what you have done with your reader," he is still giving a direction, to which the pupil is expected to comply.

Category 7, Criticizing or Justifying Authority. A statement of criticism is one that is designed to modify student behaviour from non-acceptable to acceptable. It includes teacher's statements, for instance, "I do not like what you are doing. Do something else". Another group of statements are those that might be called statements of defense or self-justification. Other kinds of statements that fall in this category are those of extreme self reference or those in which the teacher is constantly asking the children to do something as a special favour to the teacher.

All statements made by the teacher are categorized into one of the categories mentioned above. If the observer decides that with a given statement he is restricting the freedom of students, the statement is marked in categories 5, 6, or 7. If, on the other hand, the observer decides that the teacher is extending the freedom of the children, the category to be used is 1, 2, 3 or 4.

PUPIL TALK

Student Behaviour

Category 8, Pupil-talk-Response. This category is employed when the teacher has initiated the contact or has solicited student statements, when the student answers a question put by the teacher, or when he responds verbally to a direction given by the teacher. Any thing that the student says that is clearly in response to teacher's initiation belongs to category 8.

Category 9, Pupil talk-Initiation. If the student raises his hand to make a statement or to ask a question when he has not been prompted to do so by the teacher, the appropriate category to be used is 9.

Distinguishing between categories 8 and 9 is often difficult. If the answer is one that could be predicted by the observer (as well as the teacher and class), then the statement comes under category 8. When in response to a teacher question the student gives an answer different from that which is expected for that particular question, then the statement is tallied a 9.

Other Behaviour (Events)

Category 10, Silence or Confusion. This category includes anything else not included in other categories. Periods of confusion in communication, when it is difficult to decide who is talking are categorized in this category.

The Flanders Interaction Analysis system has been summarized in the tabular form to have a glance of these categories. It has been shown in Table 2.4.

Description of Galloway and French Non-verbal Interaction Categories

Galloway and French (1968) have developed two non verbal categories to further describe each verbal category of Flander's system, which have been viewed on a continuum from encouraging to restricting communication. These non-verbal categories have been described as below:

Category one of the Flanders' system (accepts student feeling) suggests both verbal and non-verbal phenomena. The verbal and non-verbal behaviours used by the teacher in accepting children feel-

- 2. Praises or Encourages: Praises or encourages pupil action or behaviour. Jokes that release tension, but not at the expense of individual student, nodding head or saying 'Um hm' or 'go on' are included.
- 3. Uses Ideas of Pupils: Clarifying, or developing ideas suggested by a pupil. Teacher extensions of pupil ideas are included but as the teacher uses more of his own ideas shift to category 5.
- 4. Asks question: Asking a question about content or procedure with the intent that a pupil will answer.
- 5. Lecturing: Imparting facts or opinion about content or procedures, giving his own explanation, or citing an authority other than a pupil.
- 6. Giving directions: Commands or orders to which a pupil is expected to comply.
- 7. Criticizing or justifying Authority: Statements intended to modify pupil behaviour from non-acceptable to acceptable pattern; bowling some one out; stating why the teacher is doing what he is doing, extreme self reference.
- 8. Pupil-Talk Response: Talk by pupils in response to teacher. Teacher initiates the contact or solicits pupil statement or structures the situation. There is limited freedom to express own ideas.
- 9. Pupil Talk-Initiation: Pupils express own ideas; initiating a new topic; freedom to develop opinions and a line of thought, asking thoughtful questions, going beyond the existing structure.
- 10. Silence or Confusion: Pauses or short period of silence and confusion in which communication can not be understood by the observer.

Indirect Talk

Teacher Talk

Teacher Talk

Response Initiation Pupil Talk

Silence or Confusion ings are so closely related that any specification of particular cues which distinguish either the verbal or non-verbal aspects becomes exceedingly difficult. Infact, the verbal characteristics are more elusive and hazardous to predict and defend than the non-verbal aspect. It is not difficult to decide whether the teacher does or does not accept student feeling, but an observer is forced to make an observation solely on the basis of verbal information. The teacher behaviour of accepting student feeling is a conjoint verbal and non-verbal activity.

Flanders category two (praises or encourages) involves a nonverbal dimension which can be subdivided as congruent or incongruent. When congruency occurs between the teacher's nonverbal cues and his verbal message the teacher's loyalty can be believed. Non-verbal cues can reinforce and further clarify the credibility of a verbal message so that no ambiguity in interpretation is made. When a discrepancy or contradiction appears between verbal and non-verbal actions the appearance of an incongruity can be noted. Individual styles of teacher behaviour are so variant that congruities and incongruities can appear in many behavioural manifestations. Praise and encouragement are demanding behaviours on the part of teachers and incongruities occur most frequently at the time of praising or encouraging An important ground rule to be remembered in observing teacher praise and encouragement is that all behaviour should be viewed as congruent until it is obvious that an incongruity is evident.

The non-verbal dimensions of category three (uses student idea) are related to the question of whether a teacher actually uses an idea or merely acknowledges it, which discriminates it as either an implementing or prefunctory behaviour.

Although Flanders makes no distinction within this category, there are two ways in which teachers may deal with student ideas or thoughtful contributions. In one way he may merely recognize or acknowledge student idea or expression by automatically repeating or restating it. A teacher's use of student ideas in this way is prefunctory or pro forma. Another way is that a teacher may respond by using a student's idea in subsequent discussion; he may react to an idea by reflecting on it; or he may turn it to the class as worthy of consideration. Teacher response of this kind can be distinguished from prefunctory acknowledgement of student ideas, and can be said

as truly using or implementing ideas. Both perfunctory and implementing use of ideas are largely dependent upon the purpose and direction of teacher response. While nonverbal cues are always present, they are very less but more mechanical in a perfunctory response. A perfunctory use of idea undoubtedly provides steady reinforcement, and the importance of this response can not be denied. But the active involvement and partial reinforcement provided by implementing use of ideas in discussion is rather more important to fostering classroom interactions and classroom learning.

Asking-question category four of the Flanders system can be personal or impersonal. In fact, the difference between personalized and impersonalized questions is the difference between a face-to-face confrontation and a verbal interchange in which mutual glances, and intimate physical expressions of feeling are avoided. Nonverbal cues which personalize questions carry warmth, a sense of closeness or proximity, the implication that the teacher has a personal involvement. Impersonal-questioning convey detachment, aloofness, and a sense of distance. In both circumstances, nonverbal cues provide the basis for the distinction.

Lectures or giving information (category five) can be seen in the light of teacher ability or willingness to use pupil nonverbal cues as basis to guide further teacher-talk. A teacher can be responsive or unresponsive to pupil behaviour and the key-point of this dimension is the teacher's sensitivity to his own behaviour when dealing with students. If pupils seem to be restive, bored, disinterested, or inattentive, the teacher may alter the pace or direction of his own lecture - this is responsive behaviour. Teachers are frequently unable or unwilling to change the pace or direction of their talk; they also feel difficulty in detecting the meaning and relationship of pupil nonverbal cues to their verbal performance-teacher talk that still continues in the face of unreceptive student behaviour is unresponsive. A significant dimension in a description of lecturing or information-giving behaviour is the nonverbal expression and response of pupil behaviour to teacher talk, and the teacher's use of that feedback.

Category six (gives direction) can be viewed as behaviours that involve or dismiss students. Teacher directions can involve students in the maintenance of learning tasks; or they can dismiss or control student behaviour. Involving behaviours facilitate pupil-teacher interactions, while controlling behaviours restrict interaction. Facili-

tating directions give students the idea that learning is a conjoint venture in which both pupils and teacher have a mutual purpose. Dismissing directions tend to be punitive. The notion is that the teacher would rather not clarify with directions but would rather control student involvement and independence.

The dimension firm or harsh is useful to qualify category seven (Criticizes or justified authority). Firm criticisms evaluate a situation cleanly and crisply, and clarify expectations for the situation. They lack the hostility, severity, and indignity of harsh criticisms, and they do not include the aggresive or defensive behaviours which criticisms can sometimes yield. It is almost needless to point out that teacher nonverbal cues most often provide the means for differentiating between criticisms or authority – justifications that cause the difference between firm or harsh.

Flanders divides student talk into two categories (response to teacher, category-eight; and student initiated talk, category-nine). One nonverbal dimension is appropriate to both categories, because teacher behaviour during student talk is almost entirely the nonverbal activity of being receptive or inattentive. Receptive teacher behaviour include attitudes of listening and interest, facial involvement, and eye contact, and suppression of teacher distraction and egoism. In attentive teacher behaviours during student talk generally show a lack of attending, eye contact, and teacher travel or movement.

Category ten (silence or confusion) in the Flander's system is treated as a "Catch-all" category, and carry little inherent value. Yet, there are different types of silence and confusion which can exist in a classroom. The dimension of comfort or distress helps for recording the distinction—comfortable silences are characterized by times of reflection, thoughts, or work; distressing silences are produced by embarrassment or tension-filled moments. Comfortable periods of confusion are those in which students are stimulated or exhibit excitement to do work, while distressing moments of confusion reflect disorganization and disorientation. It is primarily the nonverbal cues provided by the teacher which set the stage for either comfortable or distressful classroom instances and occurrances. The adding of the nonverbal to this category makes it much more useful and meaningful in analysing actual classroom interaction.

Significance of Galloway-French Verbal and Non-verbal Interaction Technique

The firm conviction that non-verbal cues are extremely important in terms of the impact a teacher leaves upon pupils is inherent in Galloway's (1974) statement: "We often express evaluations without words that we could never have the courage to state verbally."

Basically, interaction analysis provides a means of quantifying the classroom events and serves as a convenient tool for testing the hypotheses of the socio-emotional climate theory. French and Galloway (1968) began to question whether verbal behaviour was representative of the total behaviour and studied the effects of encouraging restricting non-verbal behaviours to develop the paradigm which fits and works so well with the Flander's system.

Rosenshine and Furst in a review of 76 instruments for observation of classroom instruction, suggest that the procedures, French and Galloway developed for using variables within a category system seem to be applicable to all behavioural items in all observation systems (R. M. W. Travers, 1973).

Galloway's system fulfils "the need to describe and analyse the influences of teacher verbal and non-verbal messages" (Travers, 1973).

The Galloway's system could have been classified as instruments for either teacher feed back or description. (Travers, 1973).

Lail (1968) used the system developed by Galloway in teachertraining and supervision (Travers, 1973).

Galloway believed that "teachers convey information to students through non-verbal behaviour" (Galloway, 1968, p. 172) and hoped that his instrument could help teachers, "become more aware and knowledgeable of non-verbal cues" (Galloway, 1968, p. 175) and of incongruences between their verbal and non-verbal behaviour, (Travers, 1973).

Galloway's system allows the observer to use the categories, time intervals and ground rules of the original Flander's interaction analysis system while recording the non-verbal dimensions of teaching (Galloway, 1976).

The IDER system has been used by French (1968), Cosper (1970), Parker (1970), Shepard (1971), Fowler (1972), Crump (1974), London (1975), Hankins (1975), Phillips (1975), Stankus (1977),

Frances (1977), Walsh (1977), Huntley (1978), Fullertone (1978) and Crawford (1980) for their doctoral dissertations (Dissertation Abstracts International).

Validity of non-verbal coding was established by Galloway who used a panel of experts to verify the categories and further documented with the IDER by French (Achilles & French, 1977).

The content validity of the system has been derived from the observational systems on which it is based. It is very easy to find the literature to support Flander's system when one considers this condition. Flanders (1965) has written much about the use of the system with elementary school teachers and reports of its use with seventh and eighth grade teachers. Pankratz (Hager, 1974) used the instrument with twelth grade teachers, and Hager (1974) writes about learning climate as a result of studies in which he used Flander's system with college engineering students (Stankus, 1977).

The validity of a tool "the Teacher Affective Feedback Guide" developed by Bruininks (1975) has been established against Galloway system.

Recent review of studies suggests that the potential of IDER as both a research tool and a feedback system is significant (French & Galloway, 1968).

Encoding Process of Classroom Verbal and Non-verbal Interaction

Using the IDER system, the observer can tabulate the teachers and pupils verbal behaviour and teachers nonverbal behaviour during the visit to the classroom. This instrument provides a multi-dimensional system of recording the teacher behaviour.

Atleast twenty minutes of coding is recorded during each visit as explained here. A tabulation every three second (or as often as the talk changes if the changes occured more often than at three second intervals), is recorded. This means that in class discussion where the teacher (1) imparts information by lecturing, (2) asks a question, (3) gets a response from a pupil, (4) asks another question, (5) gets further response, and (6) praises the pupil for that response, the tabulation will appear as shown in Table 2.5.

TABLE 2.5

Tabulation of Verbal Interaction Category

Three second interval	Category	Description
(1)	5	Lecturing
(2)	4	Asks question
(2)	4	Asks question
(3)	8	Pupil response
(3)	8	Pupil response
(4)	4	Asks questions
(5)	8	Pupil response
(6)	2	Praises or encourages

The single 5 indicates that the teacher lectured for approximately three seconds. The question he put for six seconds, as shown by the two 4's. The two 8's indicate that the pupil response took approximately six seconds, followed immediately by further questioning by the teacher (the single 4). The single 8 shows that the pupil responded, perhaps clarifying or extending the previous responses, followed by teacher praise (2). If the questions and responses had been continued, a series of 4's and 8's would have replaced those as shown, suggesting that the questioning and responding occurred through several three-second interval.

To add the non-verbal dimension to the verbal tabulations, a slash (/) is written directly behind a tally to show an encouraging non-verbal behaviour on the part of the teacher, and a dash (-) to illustrate the restricting non-verbal behaviour. A circled number is used to enclose the category frequency when teacher behaviour is solely nonverbal. An example has been provided in Table 2.6.

This pattern could result from a situation in which some disturbance took place involving inappropriate behaviour (category 10) followed by the teachers issuance of directions (category 6), both with a restricting nonverbal behaviour showing her displeasure.

The 5's indicate that she has proceeded with lecture (that is, encouraging non-verbally) followed by questioning (category 4). The nonverbal notation (/) suggests that he encouraged the students to answer the questions and, finally, praised through some non-verbal gesture or physical proximity.

TABLE 2.6

Tabulation of Verbal and Nonverbal Interaction
Categories

	Andrew Control of the	
Three second interval	Category	Description
(1)	10-	Silence-Distressful
(2)	6-	Giving directions Dismissing
(2)	6-	Giving directions-Dismissing
(3)	5'	Lecturing-Responsive
(3)	5′	Lecturing-Responsive
(4)	4'	Asks questions-Personal
(4)	4'	Asks questions-Personal
(5)	8′	Pupil response-Attentive
(5)	8′	Pupil response-Attentive
(6)	2′	Praises-congruent
		Story In court I

Ground Rules for Observation System

The Galloway-French system permits an observer to use the categories, time-intervals, and ground rules of the original Flanders observation system while recording nonverbal behaviours simultaneously with verbal behaviours. These ground rules of observation aid in maintaining consistency in trying to categorize teacher behaviour. They have been useful in working classroom with all subject areas and at all grade levels.

Rule 1. When not certain to which of the two or more categories a statement belongs, the category that is numerically farthest from category 5 is chosen. This is true except when one of the two categories in doubt is category 10, which is never chosen, so long as there is an alternate category under consideration.

Rule 2. If the primary tone of the teacher's behaviour has been consistently direct, or consistently indirect, we do not shift into the opposite classification unless a clear-cut hint of shift is given by the teacher.

Rule 3. The observer must not be overly concerned with his own biases and prejudices or with the teachers intent.

Following this rule the observer asks himself the question, "what does this behaviour mean to the pupils so for as restriction or expansion of freedom is concerned. For example, if, when the teacher attempted to be clever, pupils view his statements as criticism of a pupil, observer used category 7, rather than category 2. Sarcastic behaviours are also included in category 7. This rule has specific value when applied to problem of helping teachers to get insight into their own behaviour. The question is simply, "What category best describes the particular bit of interaction?"

Rule 4. If more than one category occur during the three second interval, then all categories used in that interval are recorded; therefore, each change in category is recorded. If no change occurs within three seconds, that category number is repeated.

This rule is related with the condition in which statements from two categories occur during a three second period. Generally, the observer writes down a category number every three seconds. The pace of recording is evenly maintained so that only one category number is noted during this period. However, if there is a change in categories during this interval, the observer records the change within the three second interval.

Thus, a category number must be recorded every three seconds unless the teacher changes categories within the three second interval. If more than one category occurs during the three second interval, then all categories in the time period are recorded.

Rule 5. If a silence is longer than three seconds, it is recorded as a 10 (This rule is listed because observers generally ignore short periods of silence). The category 10 is also used when two or more students use to talk at once and when there was slight confusion in the classroom so that the observer could not identify a single speaker. Breaks in the interaction in the form of silence or confusion are also classified in category 10.

Preparation of Observation Matrix

The classroom observer uses the specifically designed IDER matrix (R. L. French) in much the same way as the ten-by-ten Interaction Analysis matrix. Given a sequence of the encoded interaction

events, he pairs these, considering the last number of the previous pair the first number of the succeeding one, as below:

Pair a
$$\begin{cases} 10' \\ 5' \end{cases}$$
 pair b pair c
$$\begin{cases} 5^{-1} \\ 6^{-1} \end{cases}$$
 pair d pair e
$$\begin{cases} 7' \\ 5' \end{cases}$$

Next, he plots these pairs on the IDER matrix using the first number of the pair as a row designation and the second as a column designation. It is important to learn that the numbers accompanied by dashes (-) are plotted as equivalent double numbers (15, 17, 16 etc.)

For instance, the pairs of numbers shown above would be plotted in the cells represented by the following intersections (See Figure 2.1):

Each pair of numbers overlaps with the previous pair, and each number except the first and the last, is used twice. The simple reason is that a ten (10) is entered as the first number and the last in the record. This number is chosen as it is convenient to assume that each record begin and end with silence. This procedure allows

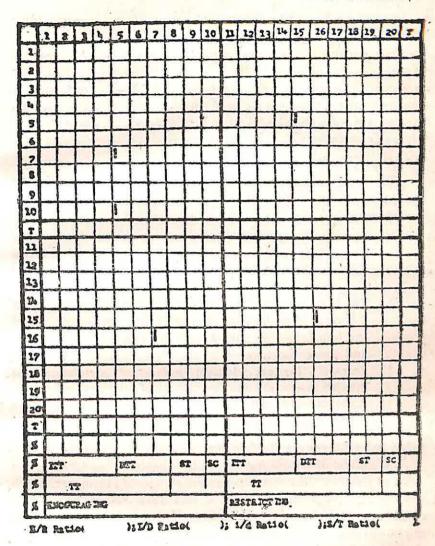


Fig. 2.1. The IDER Matrix-Sample Data Plot.

the total of each row to be equal to the total of the corresponding column.

It is possible to check the tabulations in the matrix for accuracy by noting that there should be one less tally in the matrix than there were numbers present in the original record (N-1), ordinarily a separate matrix is prepared for each specific lesson or major activity. Matrices are more meaningful when they represent a single type of activity or work.

Statistical Technique

The statistical treatment play an important role in the analysis and interpretation of data. In the present investigation, the following inferential statistics was taken into account:

- 1. The chi-square test of independence in contingency table was used to test the significance of difference and to investigate the relationship between twenty nonverbal interaction categories for different groups of teachers.
- 2. The t-test was employed to test the significance of mean difference of each of the computed four behaviour ratios and four behaviour components for language, social-studies and science teachers.
- Pearson's Product Moment method of correlation was applied to ascertain the significance of relationship between different verbal and nonverbal behaviour components for different groups of teachers.

Intra-Inter Observer Reliability

A method of estimating reliability should be as simple and quick as possible. Bales proposes an adaptation of chi-square, which was not so appropriate for our purposes than was Scott's (1955) coefficient. Scott's method remains unaffected by low frequencies, can be adapted to per cent figures, can be calculated more rapidly in the field, and is more sensitive at higher levels of reliability. The Scott's method has the benefit that adjustments are made for the number and extent to which each category is used (Amidon and Hough, 1967).

Scott calls his coefficient of reliability 'pi' (π) and it is determined by the formula (Ober et. al., 1971) given below:

Scott's pi =
$$\frac{p_o - p_e}{1 - p_e}$$

Where p_0 = the proportion of agreement between two observers

p_e = the proportion of agreement expected by chance which is calculated by squaring the proportion of tallies in each category and summing these overall categories.

In order to use Scott's pi method of reliability, the user must first determine the percentage of each category recorded by two observers. Two collection sheets are prepared. These sheets contain the data of two observers who have recorded approximately six minutes of verbal interaction in a classroom situation. To determine the percentage of each category for a given period of observation, it is necessary to count the number of tallies for each category and summarize the results.

After adding the tallies per category, the total number of tallies on the data collection sheet are counted and checked. When the number of tallies per category and the total number of tallies have been determined, the ratio and percentage for each category can be computed.

Percentage of category = No. of tallies in a category × 100

Total No. of tallies recorded

Thus, the ratio and percentage are determined and recorded on the work sheet. The sum of the ratio should be approximately 1.00, though they will vary slightly as a result of rounding. The discrepancy between the percentage of each corresponding category for the observers is computed. It denotes the total disagreement between two observers and is used to calculate P_o , the agreement between observers:

P_o=Greatest possible agreement—disagreement =1.00—disagreement

P_o is calculated by using a short method that minimizes the work considerably and is accurate enough for general use. To compute 'P_o' two highest percentages of categories for the first/second observer is selected and squared each and the two variances are added. Thus, the values of P_o and P_o are substituted in the formula for obtaining the estimate of reliability of observers using classroom interaction analysis. In this study, Scott's formula was employed for determining the observer's reliability.

CHAPTER 3

Data Collection and Organization

The Galloway's IDER category system was used for collecting the verbal and non-verbal interaction data in the live class-rooms of a representative sample of language, social studies and science teachers with regard to their sex.

Class-room Interaction Schedule

During practice teaching the class-room verbal and non-verbal interactions were encoded through IDER on the record sheet by the investigator himself. A copy of the record sheet has been given in Appendix A-1. The data collection was completed in two years. It was started on 10.9 81 in the session 1980-81 and continued upto 9.3.82 in the session 1981-82. The schedule for collection of interaction have been provided in Table 3.1.

Intra-inter observer's Reliability

Much of the reliability and validity of interaction data depends upon the observer's agreement (Intra-Inter Observer's Reliability) who use the observation system. Precision, accuracy and validity of the data depends upon the observers who collect them, thus trained, experienced and expert observers occupy an important place in the systematic observation of classroom behaviour

The observer occupies a best position in the class-room to hear and see the participants. At the end of each three second period, he decides which category best represents the communication events just completed. He notes down the category number while simultaneously assessing communication in the next period and continues at a rate of 20 observation tallies per minute, keeping his tempo as steady as possible. His notes are merely a series of numbers written in a column, from top to bottom, so that original sequence of events is preserved. Occasionally marginal notes are written to explain the class-room structure or any unusual circumstance, when there is a

A Schedule of Class-room Observation with IDER in Different Institutions

Date	Observation	1-1-81 to 6-1-81 and 1-2-82 to 11-2-82	25-1-81 to 7-2-81	26-11-81 to 4-12-81	7-12-81 to 12-12-81 and 18-1-82 to 20-1-82	25-1-82 to 30-1-82	15-2-82 to 19-2-82
	Language Social Science Studies	19	13	1	es .	7	=
Female	Social Studies						
Fe	iage S S	=	4	∞ \	91	m	00
	Langu	10	1	Ξ.	15	6	9
	ence	Single-		empe .	- 44		
	Scia	16	14	1	1	9	41
Male	Language Social Science Studies	18	e e	10	1	∞	Ξ
	angnage	13	7	14	I	12	6
	Name of Training Institution Lo	1. A.V.M. College of Education, Jaipur	Regional College of Education, Ajmer	Rajasthan Vidyapeeth 14 College of Education, Shahpura	Bal Mandir Women's Teachers Training College, Jaipur	Correspondence, course, 12 Rajasthan University, Jaipur	G.P. College of Educa- 9 tion, Bagar
;	Nam	÷	7	က်	4	v,	9

major change in class formation, the communication pattern, or the point under discussion, a double line is drawn and the time indicated. As soon as the total observation is finished, the observer retires to a nearby room and completes a general description of each specific activity separated by double lines, including the nature of the activities, the class formation and the position of the teacher. The observer also adds additional notes that are pertinent to an adequate interpretation. For this purpose, investigator uses printed record sheets, a copy of the classroom observation sheet has been given in the Appendix A-1.

Before collecting the actual observation and implementing above schedule for interaction analysis, the intra-inter observer reliability was evaluated by using Scott's formula. The investigator himself and his colleagues who were interested in the area completed the observation schedule. The intra-inter observer agreement was estimated, both the observers practised for encoding the interaction of teachers, through IDER category system. They observed the same class simultaneously for twenty minutes in a classroom situation. The number for tallies for each category were counted for both the raters. Thus, the total number of tallies is determined and checked on the data collection sheet. The ratio and percentage were computed for tallies of each category and recorded on worksheet. The obtained tallies, ratios and percentages of the raters have been provided in Table 3.2.

The difference of percentage was added, and was obtained to be 12.8. It represents the total disagreement between the two observers and was used for calculating P_o , the agreement between the observers. The greatest possible agreement would be 100 per cent or 1.00.

$$P_o = 1.00$$
 —disagreement
 $P_o = 1.00 - .128 = .872$

 P_e represents the agreement between the two observers that occured purely by chance. P_e was computed by selecting the two highest percentages for the second observer i.e. '314 and '215. The ratios were squared and summed up for P_e value.

$$P_e = (.314)^2 + (.215)^2 = .14482$$

These values were substituted for obtaining reliability index (π) in Scott's formula:—

$$\pi = \frac{P_0 - P_e}{1.00 - P_e} = \frac{.872 - .14482}{1 - .14482} = \frac{.72718}{.85518} = 0.85$$

Thus, the reliability coefficient 85 was recorded for raters agreement. Generally the reliability 0.70 or better can be achieved by most serious reciprocal category system (R. C. S.) students. In workshop's objective, reliability 60 is frequently established as an acceptable criterion of reliability. However, the obtained reliability index appears a significant agreement between the observers who obtained the encoding for class-room behaviour.

Preparation of Verbal and Non-verbal Interaction Analysis Matrices

Each observation system is essentially a process of encoding and decoding. In the encoding procedure classroom acts are recorded in the form of categories—a code symbol is assigned to each category. Decoding is the reverse operation, a Trained and Expert Analyst interprets the display of coded symbols, in order to comment appropriate statements about the original events which were encoded, even though he may not have been present at the time of data-collection. For this purpose observation matrices were prepared by tabulating coded symbols

In order to tabulate a matrix, code symbols must be observed and recorded in a fashion which preserves the original sequence of the classroom events. The ovservation matrix table consists of 20 rows and 20 columns, which is a compact and useful arrangement of 400 pairs. There are 400 cells formed by rows and columns and each has its own name with its cell address. The 20×20 observation matrix is called the IDER Matrix which has been shown in Appendix A-2.

When the observation matrix is prepared, two numbers are taken at a time and one tally is entered into the 20×20 matrix. The first number stands for row and second number for column, but it is interesting to note that 10 category is added in the beginning and at the end of the obtained series of coded categories before preparation of 20×20 matrix. The procedure is followed for preparing the matrix after making the tallies for the series, each corresponding row

Observers Frequency, Ratio, and Percentage of Categories Recorded in 20 Minutes Classroom Teaching TABLE 3.2

				Cla	Classicon a			
			Observer 'A'	ver 'A'		Observer 'B'	·B'	Difference of Percentage
	Category	1 ~	Ratio	%	f	Ratio	%	
-:	Accepts feeling-							
	Acceptance	0	000-	0.	0	000-	0.	0.0
7	Praises-congruent	3	200.	.7	9	.014	1.4	7.
e.	Using Pupils Ideas 7	3 7	.017	1.7	4	600.	6,	9.
	Implementary							
4.	Asks question-	70	.164	16.4	. 64	.151	15·1	1.3
	Personal							
5.	Lecturing-	105	.246	24.6	16	.215	21.5	3.1
	Responsive							
9	Giving direction- 64	64	.150	15.0	28	.137	13.7	1.3
	Involving						No.	
7.	Criticising-Firm	7	.017	1.7	2	.012	1:2	4.
∞•		128	.300	30.0	133	.314	31.4	1.4
	Attentive							
6	Pupil Initiation-	7	-005	ŗ.	-	-005	.5	÷.
	Attentive					*		
				T. C.				(Popula)

1.2	C	•		c	·		ç	4	Ç		·		O.		· c		ç			2		
3.8	ć		Ų	1.7	C	.7		٧	•	>	ç	•	,	7	c				0.0	8.5		
.038		000.		.017		-005	000	700.	000	000.	000	000-	.00	700.	000	000	000-	000-		.080		
16		0		7			70		•	0	gr	0				0		0		36		
.5	ji	o.		1.5		.5	(3	o.		o.	į.	•		?		o,		o.	Ì	1.0		
-005		000-		.012		-005		000.		000.		000-		.002		000.		000.		0.00		
7		0		2		7		0		0		0		-		0		0		30		
Silence-	Comforting	Accepts feeling-	Indifference	Praises-	Incongruent	Using Pupil's	Ideas-Perfunctory	Asks question-	Impersonal	Lecturing-	unresponsive	Giving direction-	Dismissing	Criticising-	Harsh	Pupil Response-	Inattentive	Pupil Initiation-	Inattentive	Silence-	Discomforting	
10.		11.		12.		13.		14.		15.		16.		17.		18.		19.		20.		

and column total should be equal, if there is no error in tabulation. This tabulation is interesting but very time consuming affair. A copy of the IDER Matrix table has been provided in Appendix A-3.

Therefore, in the present investigation the above procedure was followed for tabulating matrices with the help of observation record sheets of secondary student-teachers. Two hundred and nintynine observation matrices were prepared by the investigator himself. On an average one hour was devoted in preparing one matrix table. In the present investigation 50 matrices were prepared for male language teachers, 51 matrices for female language teachers, 50 matrices for male social studies teachers, 50 matrices for female social studies teachers, 50 matrices for famale science teachers. Thus, these matrix tables were utilized for obtaining the percentages of interaction categories, behaviour ratios, and behaviour components for analysing the results.

Decoding Procedures of Class-room Verbal and Nonverbal Interactions

Encoding and Decoding are the two processes of interaction analysis. The encoding process was attempted for preparing the observation matrix by coding numbers in relation to forty category system. The decoding is the process of interpreting the observation matrix. Interpretation of the matrix data provides the investigator with two kinds of information. One is the purely quantitative information which includes the percentages of behaviour in each category, the approximate balance of teacher-talk and pupil-talk in the classroom, the degree of nonverbal encouragement or restrictiveness, and verbal directness or indirectness of influence manifested in the behaviour of the teacher. These latter bits of information are obtained from the computed ratio.

Another kind of information concerning behavioural patterns and the type and structure of communication events becomes available with careful analysis of specific regions of the matrix. First, a survey of the four quadrants (see Figure 3:1) of the IDER matrix provides information about the basic nature of the teacher's behaviour. A heavy loading of tallies in quadrant I indicates that the teacher is essentially encouraging in his/her nonverbal behaviour. Large number of tallies in quadrant III suggest consistent teacher restrictiveness of nonverbal interaction. Heavy emphasis in quadrants II and IV shows vacillation in teacher's behaviour. However, it must be remembered that these are transition quadrants, and some use of them is to be expected.

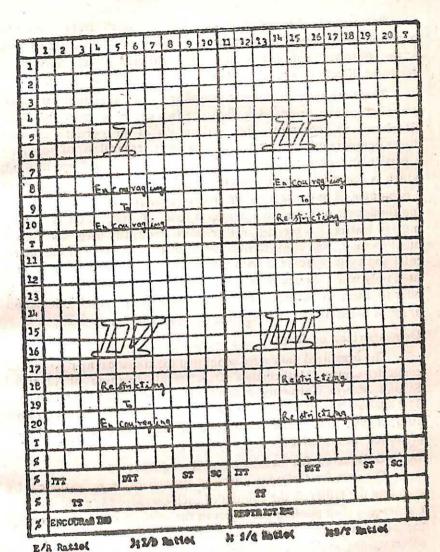


Fig. 3.1. The IDER Matrix-Interpretation by Quadrants.

Behavioural flow patterns can also be traced from initiation to completion throughout the four quadrants of the matrix so long as the observer remembers that such patterns always move in a clockwise direction (French, 1968).

There are three arithmatic procedures that are commonly used in order to make comparison between two or more matrices. They all share in common, the setting up of proportions so that direct comparisons of number, can be made, regardless of how long a particular observation lasted. The most elegant and one method, which is generally used in research projects and that have access to a computer, is to convert all matrices into composite matrices involving thousands of tallies to a common base of 100. This is called a millage matrix. A second, rather more frequently used and convenient method, is to convert all column totals to per cent of the matrix total and then compute certain interaction ratios. A third method is used only when the matrices are involved and there is no need to refer to normative expectations. This requires a simple calculation of ratios based on the matrix tables (Flanders, 1970).

Organization of Data

The organized data were submitted for statistical analysis at the computer centre, Mathematics Department, Institute of Advanced Studies, Meerut University, Meerut (U. P.) on 78 Micro-Computer. The analysis was started on 15th June, 1982 and was carried on upto 10th August, 1982. The three types of data were computed and organized into tabular form.

Data Collection for Interaction Categories

The data for Galloway's twenty categories were gathered by counting the tallies of the column of each category for each student-teacher and then pooling the tallies of the column of each category for male language, female language, male social studies, female social studies, male science and female science teachers. The tallies were again pooled for language, social-studies and science teachers by combining male and female groups. Thus, the frequency of male, female and combined groups were organised into the tabular form for language, social studies and science teachers, which have been summarized in Table 3.3.

Organization of Data for Behaviour Ratios

One of the rigorous analyses, used generally for research purpose is the interpretation of teacher-pupil interaction in terms of

Frequency of Twenty Categories (IDER) of Male, Female and Combined Groups for Language, Social Studies and Science Teachers TABLE 3.3

10.7		Language			Social-Studies	lies		Science	51
Category	Male	Female	Combined	Male	Female	Combined	Male	Female	Combined
	1.7	CV.	50	15	41	56	19	18	37
- (17	110	131	4	122	163	59	107	166
71	143	179	321	111	133	244	163	176	339
0 -	1570	1676	3254	1438	1444	2882	2791	2385	5176
4 v	13/8	10/01	9084	6406	6432	12838	5095	4646	9741
0	1000	2080	5753	1932	2075	4007	2691	2613	5304
01	124	308	442	118	217	335	210	500	419
- 0	461	4776	8434	3708	3614	7322	3583	3207	0629
0.0	224	220	553	287	225	512	470	218	889
y 5	1700	1561	0952	669	898	1567	1206	1539	2745
1.	10	1001	11	0	1	-	0	0	0
11	07	143	223	06	75	165	105	86	203
7.1	020	198	468	147	119	266	408	262	029
C 7	263	74	337	287	186	473	80	140	220
15	684	244	928	1306	986	2292	535	295	830
19	379	387	992	245	351	965	193	189	382
17	266	268	534	248	124	372	171	180	351
. ~	318	128	446	301	176	477	58	149	207
10	201	101	302	180	119	299	06	42	132
20.	2959	2647	2606	2554	2188	4742	2505	2863	2368
T	19947	20265	40212	20113	19496	39609	20432	19336	39768
The state of the s			The same of the sa	-		The state of the s			The state of the s

behaviour ratios. These behaviour ratios have been explained and the obtained data for these ratios were organized into tabular form. In the present investigation, four important behaviour ratios appropriate to an interpretation of data were considered. The collected data for each behaviour ratio were organized into tabular form with regard to male language teachers, female language teachers, male social studies teachers, female social studies teachers, male science teachers and female science teachers. The description of the behaviour ratios have been reviewed as follows:

Encouraging to Restricting Non-verbal Behavious Ratio

It is used to estimate the degree of encouragement and restrictiveness in the nonverbal behaviour of the teacher. E/R Ratio may be operationally defined by noting down the proportion of the degree of encouragement and the degree of restrictiveness. It can be computed by adding the behaviours in columns 1-10 and dividing by the sum of behaviours in columns 11-20. It can be written as:

E/R Ratio =
$$\frac{1+2+3+4+5+6+7+8+9+10}{11+12+13+14+15+16+17+18+19+20}$$

Indirect to Direct Verbal Behaviour Ratio (I/D Ratio)

In the past it was customary for investigators in this area, using Flanders technique to involve such measures as I/D ratio to estimate for direct and indirect influence of teacher verbal behaviour. It may be operationally defined by noting down the proportion of indirect influence and direct influence of the teacher. It can be computed by adding the sum of behaviours in columns 1-4 and/or 11-14 and dividing by the sum of behaviours in columns 5-7 and/or 15-17 for each quadrant, each half and the whole matrix. It can be written as:

I/D Ratio =
$$\frac{1+2+3+4+11+12+13+14}{5+6+7+15+16+17}$$
 (for the whole matrix)

Revised Indirect to Direct Verbal Behaviour Ratio (i/d Ratio)

The revised I/D ratio represents only those categories of teacher talk which are concerned with motivation and control (acceptance of feeling, acceptance of ideas, praise, giving direction, and criticism) and excludes the categories concerned with content (question and

lecture). It is calculated by dividing the sum of behaviours in columns 1, 2, 3, and/or 11, 12, 13 by the sum of behaviour, in columns 6, 7 and/or 16, 17 for each quadrant, each half and the whole matrix. It can be written as:

i/d ratio=
$$\frac{1+2+3+11+12+13}{6+7+16+18}$$
 (For the whole matrix)

Student-Teacher Talk Ratio (S/T Ratio)

It may be defined as an index representing the proportion of student-talk to teacher-talk. It is calculated by dividing the student-talk (the sum of behaviours in columns 8 and 9 and/or 18 and 19) by teacher-talk (the sum of behaviours in columns 1 to 7 and/or 11 to 17) for each quadrant, each half and the whole matrix. It can be written as:

S/T Ratio =
$$\frac{8+9+18+19}{1+2+3+4+5+6+7+11+12+13+14+15+16+17}$$
 (For the whole matrix).

Thus, the data for four behaviour ratios were computed and organized in a tabular form for different groups of teachers. The mean and S. D. values were also computed which have been summarised in Table 3.4.

Data Organization for Behaviour Components

A third type of data for verbal and nonverbal behaviour were obtained for behaviour components. These behaviour components have been mentioned and used by French himself for extracting the factors for classroom interaction. The collected data for each behaviour component were organized into tabular form for different groups of teachers. The relevant statistics were computed with the help of symbols and formulae summarized in Table 3.5.

TABLE 3.4

Mean and S. D. of Behaviour Ratios of Male, Female and Combined Group for Language, Social Studies and Science Teachers

Group	Behaviour	1	1ale	Fema	le Co	ombined	Group
Стоир	Ratios	M	SD	M	SD	M	SD
Language Teachers	E/R	3.24	2.66	5.05	3.33	4.30	3.11
	I/D	0.28	0.13	0.31	0.17	•29	•16
	i/d	0.18	0.17	0.19	0.15	·19	•16
	S/ T	0.39	0.15	0.50	0.21	•45	·19
Social Studies Teachers	E/R	3.31	1.69	4.86	3.57	4.09	2 ·90
	I/D	•22	•13	•23	·12	.22	•13
	i/d	.17	·14	2•21	2.84	•19	.22
the fact	S/T	•39	•21	•35	•14	·37	-18
Science Teachers	E/R	4.92	3.03	4.52	2.57	4.72	2.82
	I/D	0.44	0.25	0.43	0.21	•43	·23
	i/d	0.25	0.18	0.25	0 ·2 2	•25	•20
	S/T	0.36	0.18	0.33	0.15	•34	•17
Size of Sample	in soul	17 113	150	t/b	149	2	.99

Symbols and Formulae for Behaviour Components TABLE 3.5

OB	Behaviour Component	Symbol	Formula
H	1. Encouragement	Columns 1 to 10	$\frac{1+2+3+4+5+6+7+8+9+10}{N} \times 100$
7	2. Restrictiveness	Columns 11 to 20	$\frac{11 + 12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 + 20}{N} \times 100$
6.	3. Indirectness	Columns 1 to 4 and 11 to 14	$\frac{1+2+3+4+11+12+13+14}{N} \times 100$
4.	4. Directness	Columns 5 to 7 and 15 to 17	$\frac{5+6+7+15+16+17}{N} \times 100$

The mean and standard deviations were computed for each behaviour component and the obtained statistics have been reported in Table 3.6.

TABLE 3.6

Mean and S.D. of Behaviour Components of Male, Female and Combined Group for Language, Social Studies and Science Teachers

Groun	Robonions	Male	e,	Female	ale	Comb	Combined Group
dnato	Component	M	SD	M	SD	M	SD
Language	Encouragement	72.28	11 99	78.73	10.23	75.54	11.59
Teachers	Restrictiveness	27.22	11 19	21-27	10.23	24.22	11.12
	Indirectness	11-82	4.64	12-11	5.91	11.97	5.32
	Directness	45.15	8.67	40.92	6.74	43.01	8.01
Social Studies	Encouragement	73.27	10.89	78.02	11.06	75 65	11.23
Teachers	Restrictiveness	26.74	10.88	21.98	11.06	24.36	11.22
	Indirectness	10.43	4.98	10.91	4.91	10.67	4.59
	Directness	50.04	8.95	52.01	9:36	51.03	9.21
cience Teacher	Science Teachers Encouragement	79.45	9.18	78-14	9.29	78.81	9.56
	Restrictiveness	22.46	13.22	21.86	9.29	.22.17	11.47
	Indirectness	18.98	11.90	16.59	5.55	17.81	9.42
	Directness	43.71	10.78	41.95	8.30	42.85	69.6
Size of Sample		150		149	Manager Manager	200	0

CHAPTER 4

Analysis and Interpretation of Data

The present chapter deals with quantitative analysis of data, which have been presented in three parts:

- 1. Analysis of Interaction Categories
- 2. Analysis of Behaviour Ratios, and
- 3. Analysis of Behaviour Components.

The three types of analysis and results have been reported in the following paragraphs:

1. Analysis of Interaction Categories

The first sub-part of analysis deals with the analysis of twenty interaction categories of Galloway-French verbal and nonverbal interaction analysis technique. The analysis involves the computation of percentage of each interaction category in the composite matrix and the χ^2 -values for the significance of difference in interaction categories of the following groups:

1.1 Male and Female Language Teachers—In this part interaction categories for male and female language teachers were calculated. The obtained percentage for each category and the X²—value have been summarized in Table 4·1.

Table 4·1 reveals that χ^2 —value was found to be 999·79 with the degree of freedom, 19 which was significant at or beyond ·001 level of confidence. Thus, null-hypothesis was rejected. In may be stated that male and female teachers seem to have significant difference in their interaction categories.

The percentage of frequency for categories 5, 9, 14, 15, 18, 19 and 20 of male language teachers 24.50, 1.63, 1.32, 3.43, 1.59, 1.01 and 14.83 respectively were higher than the percentage of frequency for these categories of female language teachers. It may be stated that male language teachers seem to use these categories more.

TABLE 4-1

Contingency table for the frequency of Interaction category of language teachers and χ^2 value for the difference between male and female teachers

Interaction	Male (Group	Fem	ale Group	
Category	Frequency	Percentage	Frequency	Percentage	
desir fa st					ency
1	17	.09	42	-21	59
2	13	.07	118	•58	131
3	142	.71	179	.88	321
4	1578	7.91	1676	8.27	3254
5	4888	24.50	4196	20.70	9084
6	2764	13.86	2989	14.75	5753
7	134	•67	308	1.52	442
8	3658	18.34	4776	23.57	8434
9	324	163	229	1.13	Sept. Decided
10	994	5.01	1561	7.70	553
11	10	.05	1301	·01	2560
12	80	•40	143	.71	11
13	270	1.35	193	.98	223
14	263	1.32	74		468
15	684	3.43	244	.37	337
16	379	1.90	387	1.20	928
17	266	1.33		1.91	766
18	318	1.59	268	1.32	534
19	201	1.01	128	.63	446
20	2959	14.83	101	•50	302
dill me		Trope of the	2647	13.06	5606
Total	19947	10.00	20265	100.00	40212

Chi-square=999.79 p<.001 Degree of freedom=19 The percentage of frequency for categories 2, 4, 6, 8, 10, 12 and 16 of female language teachers 58, 8.27, 14.75, 23.57, 7.70, 71 and 1.91 respectively were higher than those of male language teachers. It may be interpreted that female language teachers seem to use these behaviours more than their male counterparts.

1.2 Male and Female Social Studies Teachers—The obtained percentage for each category and the X²—value have been summarized in Table 4·2.

Table 4.2 shows that χ^2 —value was found to be 311.33 with 19 degree of freedom, which was significant at or beyond 001 level of confidence. Thus, null-hypothesis was rejected. It may be interpreted that there is significant difference in male and female social studies teachers with regard to their interaction categories.

The percentage of frequency for 9, 12, 15, 17, 19 and 20 categories of male social studies teachers 1.43, .45, 6.50, 1.23, .89 and 12.70 respectively were higher than the percentage of frequency for these categories of female social studies. It may be stated that male social studies teachers seem to use these behaviours more.

The percentage of frequency for 2, 5, 6, 7, 10 and 16 categories of female social studies teachers :63, 32.99, 10.64, 1.11, 4.45 and 1.80 respectively were higher than the percentage of frequency for 2, 5, 6, 7, 10 and 16 categories of male social studies teachers. Thus, it may be interpreted that female social studies teachers seem to use these categories more than male teachers.

1.3 Male and Female Science Teachers—The obtained percentage for each category and the χ²-value have been summarized in Table 4.3.

Table 4.3 indicates that the χ^2 -value was found to be 392. 1892, which was significant at or beyond 001 level of confidence with 19 degree of freedom. The null-hypothesis was rejected. It may be stated that male and female science teachers seem to have significent difference in their categories.

The percentage of frequency for 4, 5, 8, 9, 13, 15 and 19 categories of male science teachers 13.66, 24.94, 17.54. 2.3, 2.0, 2.62 and .44 respectively were higher than the percentage for these categories of female science teachers. Thus, it may be interpreted that male science teachers seem to use these categories more than their female counterparts.

The percentage for 2, 3, 10 and 20 categories of female science teachers were higher than the percentage for 2, 3, 10 and 20 categories of male science teachers. It may be stated that female science teachers seem to use these behaviours more.

TABLE 4·2

Contingency table for the frequency of interaction category for social studies Teachers and X²-value for the difference between Male and Female Teachers

Interaction	Male G	roup	Femal	e Group	
Category	Frequency	Percentage	Frequency	Percentage	Total of frequ- ency
1	15	.07	41	·21	56
2	41	•20	122	.63	163
3	111	•55	133	.68	244
4	1438	7.15	1444	7.41	2882
5	6 406	31.85	6432	32.99	12838
6	1932	9.60	2075	10.64	4007
7	118	•59	217	1.11	335
8	3708	18.43	3614	18.54	7322
9	287	1.43	225	1.12	513
10	699	3.48	868	4.45	1567
11	0	0.00	1	•01	1
12	90	•45	75	.38	165
13	147	. •73	119	.61	266
14	287	1.43	186	.96	473
15	1306	6.50	986	5.06	
16	245	1.22	351	1.80	2292
17	248	1.23	124	.64	596
18	301	1.50	176	.90	372
19	180	.89	119	.61	477 299
20	2554	12.70	2188	11.22	4742
			2100	11 22	7/44
	20113	100.00	19496	100.00	39609

Chi-square=311·33 p<:001 Degree of Freedom=19

TABLE 4.3

Contingency table for the frequency interaction category of Science teachers and X⁹ value for the difference between Male and Female Teachers

		Group	Female (Group	
Interaction Category		Percentage	Frequency	Percentage	Total of frequ- ency
1	19	09	18	•09	37
2	59	29	107	•55	166
3	163	•80	176	.91	339
4	2791	13.66	2385	12.33	5176
5	5095	24.94	4646	24.03	9741
6	2691	13.17	2613	13.51	5304
7	210	1.03	209	1.08	419
8	3583	17.54	3207	16.58	6790
9	470	2.30	218	1.12	688
10	1206	5.90	1539	7.96	2745
11	0	0.00	0	0.00	0
12	105	•51	98	•51	203
13	408	2.00	262	1.35	670
14	80	•39	140	•72	220
15	535	2.62	295	1.53	830
16	193	.94	189	.98	382
17	171	•84	180	•93	351
18	58	.28	149	•77	207
19	90	•44	42	.22	132
20	2505	12.26	2863	14.81	5368
Total	20432	100.00	19336	100.00	39768

Chi-square=392·1892 P<·001 Degree of Freedom=19.

1.4 Language and Social Studies Teachers—The obtained percentage for each category and the χ^2 -value of language and social studies teachers have been summarized in Table 4.4.

It may be observed from the table that the X2-value was found to be 2117.69 with degree of freedom 19, which was significant at or beyond 001 level of confidence. The null-hypothesis was rejected. It may be interpreted that language teachers and social studies teachers seem to have significant difference with regard to their categories.

Table 4.4 also shows that the percentage of categories 3, 4, 6, 7, 10, 13, 16, 17 and 20 for language teachers were .80, 8.09, 14.31, 1.10, 6.37, 1.16, 1.90, 1.33 and 13.94 respectively which were higher than the percentage of these categories for social studies teachers. It may be interpreted that language teachers use these categories in their classroom.

The percentage of categories 5, 14 and 15 of social studies teachers 32.41, 1.19 and 5.79 respectively were higher than the percentage for 5, 14 and 15 categories of language teachers. It may be stated that social studies teachers use 5, 14 and 15 categories.

1.5 Social Studies and Science Teachers—The obtained percentage for each category and the χ^2 -value of social studies and science teachers have been summarized in Table 4.5.

Table 4.5 shows that the χ^2 -value was found to be 2868 44 with the degree of freedom 19, which was significant at or beyond .001 level of confidence. The null-hypothesis was rejected. It may be interpreted that social studies and science teachers seem to have significant difference with regard to their categories.

Table 4.5 also indicates that the percentage of categories 5, 8, 14, 15, 16, 18 and 19 for social studies teachers were 32.41, 18 48, 1.19, 5.79, 1.50, 1.20 and .75 respectively, which were higher than the percentage of these categories of science teachers. It may be interpreted that social studies teachers seem to use these categories.

The percentage of categories 3, 4, 6, 9, 10, 13 and 20 of science teachers 85, 13.02, 13.34, 1.73, 6.90, 1.69 and 13.50 respectively were higher than the percentage for these categories of social studies teachers. It may be stated that science teachers seem to use these behaviours in their classrooms.

TABLE 4.4

Contingency table for the frequency of interaction category of Language and Social Studies Teachers and X2-value for the difference between them

*	Language	Group	Social Sta	udies Group	
Interaction Category	Frequency	Percen-	Frequency	Percentage	— Total of fre- quency
1	59	·15	56	·14	115
2	131	•33	163	•41	294
3	321	.80	244	.62	565
4	3254	8.09	2882	7.28	6136
5	9084	22.59	12838	32.41	21922
6	5753	14.31	4007	10.12	9760
7	442	1.10	335	.85	777
8	8434	20.97	7322	18.48	15756
9	553	1.37	512	1.29	1065
10	2560	6.37	1567	3.96 .	4127
11	11	.03	1	·01	12
12	223	.55	165	.42	388
13	468	1.16	266	·67	734
14	337	·84	473	1.19	810
15	928	2.31	2292	5.79	3220
16	766	1.90	596	1.50	1362
17	534	1.33	372	·94	906
18	446	1•11	477	1.20	923
19	302	.75	299	•75	601
20	5606	13.94	4742	11.97	10348
Total	40212	100.00	39609	100.00	79821

Chi-square=2117.69 P<.001 Degree of Freedom=19

TABLE 4.5

Contingency table for the frequency of interaction category of social studies and science teachers, and X2-value for the difference between them

Interaction Category	Social Studi	es Groups	Science	Group	Total of
Caregory	Frequency	Percentage	Frequency	Percentage	frequency
1	56	•14	37	.09	93
2	163	•41	166	•42	329
3	244	.62	339	·85	583
4	2882	7-28	5176	13.02	8058
5 -	12838	32.41	9741	24.49	22579
6	4007	10.12	5304	13.34	9311
7	335	.85	419	1.05	754
8	7322	18.48	6790	17.08	14112
9	512	1.29	688	1.73	1200
10	1567	3.96	2747	6.90	4312
11	1	.01	0	0.00	1
12	165	•42	203	.51	368
13	266	•67	670	1.69	936
14	473	1.19	220	.55	693
15	2292	5.79	830	2.09	3122
16	596	1.50	382	.96	978
17	372	.94	351	•88	723
18	477	1.20	207	.52	684
19	299	•75	132		431
20	4742	11.97	5368	·33 13·50	10110
Total:	36609	100.00	39768	100.00	79377

Chi-square = 2868 44 P < 001
Degree of Freedom = 19

^{1.6} Language and Science Teachers—The obtained percentage for each category and the χ^2 -value of language and science teachers have been summarized in Table 4.6.

Table 4.6 indicates that the X2-value was found to be 1089.22 for 19 degree of freedom which was significant at or beyond 001 level of confidence. The null-hypothesis was rejected. It may be stated that language and science teachers seem to have significant difference in their categories.

TABLE 4.6

Contingency table for the frequency of interaction category of language and Science Teachers and \(\chi^2\)-value for the difference between them

Interaction Category	Langue	age Group	Science	Group	Total of	
Caregory	Frequency	Percentage	Frequency	Percentage	frequency	
1	59	.15	37	•09	96	
2	131	.33	166	•42	297	
	321	.80	339	.85	660	
4	3254	8.09	5176	13:02	8430	
5	9084	22.59	9741	24.49	18825	
6	5753	14.31	5304	13.34	11057	
7-	442	1.10	419	1.05	861	
8	8434	20.97	6790	17.08	15224	
9	553	1.37	688	1.73	1241	
10	2560	6.37	2745	6.90	5305	
11	11	.03	Ö	0.00	11:	
12	223	.55	203	•51	426	
13	468	1.16	670	1.69	1138	
14	337	.84	220	.55	557	
15	928	2.31	830	2.09	1758	
16	766	1.90	382	.96		
17	534	1.33	351	.88	1148	
18	446	1.11	207		885	
19	302	.75	132	·52 ·33	653	
20	5606	13.94	5368	13.50	10974	
Total	40212	100.00	39768	100.00	79980	

Chi-square=1089.22

P < .001

Degree of freedom=19

Table 4.6 also shows that the percentage of 6, 7, 8, 14, 15, 16, 17, 18, 19, and 20 categories for language teachers were 14.31, 1.10

20.97, 84, 2.31, 1.90, 1.33, 1.11 and .75 respectively, which were higher than the percentage of these categories for science teachers. It may be interpreted that language teachers seem to use these categories more than science teachers.

The percentage of categories 3, 4, 5, 9, 10 and 13 of science teachers 85, 13 02, 24 49, 1 73, 6 90 and 1 69 respectively were higher than the precentage of these categories for language teachers. It may be stated that science teachers use 3, 4, 5, 9, 10 and 13 categories more.

2. Analysis of Behaviour Ratios

The results and interpretation have been discussed in seven sub-parts as given below:

2.1 Male and Female Language Teachers - The obtained mean, S D. and 't'-values have been provided in Table 4.7.

TABLE 4.7
Significance of Difference between Male and Female
Language Teachers with regard to
Behaviour Ratios

Behaviour Ratio		Male = 50	Female N=51	't'-value
<u> </u>	M	SD.	M SD.	df 99
1. E/R Ratio	3.54	2.67	5.05 3.33	
2. I/D Ratio	.28	·13	·31 ·17	2·52* 1·09
3. i/d Ratio 4. S/T Ratio	.18	.17	·19 ·15	.09
4. b/1 Kallo	•39	.15	·50 ·21	2.95**

^{* :05} level of significance; ** :01 level of significance.

The 't' for E/R Ratio was found to be 2.52 which is significant at 05 level of confidence. The null-hypothesis was rejected. It may be interpreted that there is significant difference between male and female language teachers with regard to the non-verbal behaviour ratio.

The 't'-value for S/T ratio was found to be 2.95, which is signisicant at both the levels. The null-hypothesis was rejected. It may be stated that there is significant difference in the groups with regard to student-talk-teacher-talk ratio.

It may also be noted from the table that 't'-values for I/D ratio and i/d ratio were obtained to be 1.09 and .09 respectively with df 99 which are not significant at any level. It may be stated that there is no difference with regard to these behaviour ratios.

2.2 Male and Female Social Studies Teachers-The obtained statistics have been presented in Table 4.8.

TABLE 4.8 Significance of Difference between Male and Female Social Studies Teachers with regard to Behaviour Ratios

	haviour		ale = 50		male =50	't'-value df 98
	dath.	M	S.D.	M	S.D.	uj 38
1.	E/R Ratio	3.31	1.69	4.86	3.57	2.78**
2.	I/D Ratio	.22	.13	•23	·12	-11
3.	i/d Ratio	•17	.14	•22	.28	1.23
4.	S/T Ratio	•39	·22	•35	·14	1.10

^{* 05} level of significance; ** 0. level of significance

The 't'-value for E/R ratio was found to be 278 which is significant at both the levels. Thus, the null hypothesis was rejected. It may be interpreted that there is significant difference between male and female social studies teachers with regard to E/R ratio.

It may also be noted from the above table that 't'-values for I/D ratio, i/d ratio, and S/T ratio were 0.11, 1.23 and 1.19 respectively, which are not significant at any level. It may be stated that there is no significant difference between the two groups with regard to these ratios.

2.3 Mule and Female Science Teachers - The obtained results have been shown in Table 4.9.

Table 49 indicates that 't'-values for all the behaviour ratios are ranging from 0 04 to 0.80 with 96 degrees of freedom, which are not significant at any level. The null-hypothesis was not rejected.

It may be interpreted that there is no significant difference between male and female science teachers with regard to these behaviour ratios.

TABLE 4.9
Significance of Difference between Male and Female Science Teachers with regard to Behaviour Ratios

	haviour tio		Male V=50	77.00	emale I=48	't'-value
4110		M	S.D.	M	S.D.	df 96
1.	E/R Ratio	4 92	3.03	4.52	2.58	.69
2.	I/D Ratio	•44	•25	•43	•21	.30
3.	i/d Ratio	•25	.18	.25	.22	.04
4.	S/T Ratio	•36	•18	.33	.15	.80

^{* ·05} level of significance; ** ·01 level of significance.

TABLE 4·10
Significance of Difference between Language and
Social Studies Teachers with Regard to
Behaviour Ratios

	haviour tios	Langu N=10	age DI		l Studies 100	't'-value
2100		M	S.D.	M	S.D.	df 199
1.	E/R Ratio	4.30	3.11	4.09	2.90	.51
2.	I/D Ratio	.29	.16	.22	•13	3.48**
3.	i/d Ratio	·19	.16	.19	•22	.26
4.	S/T Ratio	•45	•19	·37	·18	2.79**

 ⁰⁵ level of significance;
 ** 01 level of significance.

^{2 4} Language and Social Studies Teachers—The samples were reorganised to obtain language and social studies teachers. There were 101 language and 100 social studies teachers. The obtained Mean, S.D. and 't' have been shown in Table 4:10.

The 't' for I/D ratio and S/T ratio were found to be 3.48 and 2.79 respectively, which are significant at both the levels. Thus, the null-hypothesis was rejected. It may be interpreted that language and social studies teachers seem to have significant difference with regard to these behaviour ratios.

It may also be noted from the table that 't' for E/R ratio and i/d ratio were obtained to be 0.51 and 0.26 respectively, which are not significant at any level. It may be stated that there is no difference with regard to these behaviour ratios.

2.5 Social Studies and Science Teachers—The obtained results have been shown in Table 4.11.

TABLE 4-11
Significance of Difference between Social Studies and Science Teachers with regard to Behaviour Ratios

Behav Ratio		Social S N=1			ience =98	't'-value df 196
21410		М	S. D.	M	S. D.	цу 190
1.	E/R Ratio	4.09	2.90	4.72	2:82	1.57
2.	I/D Ratio	.22	.13	·43	.23	7.86**
3.	i/d Ratio	.19	.22	24	•20	1.80
4.	S/T Ratio	•37	•18	•34	.17	1.07

^{* ·05} level of significance; ** ·01 level of significance;

The 't' for I/D ratio was found to be 7.86, which is significant at both the levels. The null-hypothesis was rejected. It may be interpreted that there is significant difference between social studies and science teachers with regard to I/D ratio.

It may also be noted from the table that the 't' for E/R ratio, i/d ratio, and S/T ratio were found to be 1.57, 1.80 and 1.07 respectively, which are not significant at both the level. It may be stated that there is no significant difference in the two groups with regard to these ratios.

2.6 Language and Science Teachers—The obtained mean, standard deviation, and 't' for language and science teachers have been summarized in Table 4·12.

TABLE 4-12

Significance of Difference between Language and Science Teachers with regard to Behaviour Ratios

Behaviour Ratio			guage =101	Scie N=	't'-value df 197		
		M	S. D.		S. D.	иј 197	
1.	E/R Ratio	4.30	3.11	4.72	2 82	1.002	
2.	I/D Ratio	•29	.16	•43	•23	4.95**	
3.	i/d Ratio	.19	.16	.20	•20	2.39*	
4.	S/T Ratio	•45	•19	•34	.17	3.96**	

* '05 level of significance; ** '01 level of significance.

The 't'-values for I/D ratio and S/T ratio were found to be 4.95 and 3.96 respectively, which are significant at both the levels. Thus, the null-hypothesis was rejected. It may be interpreted that there is significant difference between the two groups with regard to these behaviour ratios.

The 't' value for i/d ratio was found to be 2.39, which is significant at .05 level.

It may also be noted from the table that the 't'-value for E/R ratio (1.002) was not significant at both the levels. It may be interpreted that there is no significant difference between language and science teachers with regard to E/R ratio.

2.7 Male and Female Teachers – There were 150 male teachers and 149 female teachers. The obtained mean, S.D. and t-values have been provided in Table 4.13.

The t-value for E/R ratio was found to be 2.63, which is significant at both the levels. The null-hypothesis was rejected. It may be interpreted that there is significant difference between male and female teachers with regard to the non-verbal behaviour ratio.

The t-values for I/D ratio, i/d ratio and S/T ratio were obtained to be 38, 84 and 69 respectively, which are not significant

at both the levels. It may be stated that there is no significant difference in the two groups with regarl to these ratios.

TABLE 4:13

Significance of Difference between Male and Female Teachers with regard to Behaviour Ratios

Linciano.	(N =	ale = 150)	(N =	't'-value	
Behaviour 'Ratio'		S. D.	M	S. D.	df 297
1. E/R Ratio	3 92	2.63	4.82	3.20	2.63**
2. I/D Ratio	•31	•20	.32	·19	•38
3. i/d Ratio	•19	.17	•22	•22	*84
4. S/T Ratio	.38	.19	•39	•19	.69

* •05 level of Significance; * * •01 level of significance

3. Analysis of Behaviour Components

The analysis and results have been discussed in the following seven sub-parts:

3.1 Male and Female Language Teachers—Their obtained mean, S.D. and 't' have been summarized in Table 4.14.

TABLE 4·14

Significance of Difference between Male and Female
Language Teachers with regard to Behaviour
Components

Behaviour Components	1	fale ∍50	Fer N=	't'-value df 99		
		S.D.	\overline{M}	S.D.		
. Encouragement	72.28	11.99	78.73	10.23	2.91*	
2. Restrictiveness	27.22	11.19	21.27	10.23	2.79*	
3. Indirectness 4. Directness	11·82 45·15	4·64 8·62	12·11 40·92	5·91 6·74	0·27 2·74*	

^{* ·05} level of significance; ** ·01 level of significance.

Table 4.14 indicates the 't'-values for encouragement, restrictiveness and directness were 2.91, 2.79 and 2.74 respectively which were significant at .05 level of confidence with 99 degree of freedom. The rull-hypothesis was rejected. It may be interpreted that male and female language teachers seem to have significant difference with regard to these behaviour components.

It may also be noted that 't' for indirectness was obtained to be 0.27. This is not significant at any level. It may be stated that there is no difference with regard to this behaviour component.

The mean of encouragement for female language teachers was higher than the mean of encouragement for male language teachers. Thus, it may be stated that female language teachers seem to use more encouragement in their non-verbal behaviour than male language teachers.

The mean of restrictiveness and directness for male language teachers were higher than the mean of these behaviour components for female language teachers. Thus, it may be interpreted that the male language teachers seem to use more restrictiveness in their non-verbel behaviour and more directness in their verbal behaviour.

3.2 Male and Female Social Studies Teachers— The obtained statistics have been provided in Table 4.15.

TABLE 4·15
Significance of Difference Between Male and Female
Social Studies Teachers with regard to
Behaviour Components

	haviour mponents		ale = 50	F N	't'-yalue			
- Ponents		 M	S.D.	 M	S.D.	df 98		
1.	Encouragement	73.27	10.89	78.02	11 06	2.16**		
2.	Restrictiveness	26.74	10.88	2 1·98	11.06	2.17**		
3.	Indirectness	10.43	4 98	10.91	4 15	0.52		
4.	Directness	50 04	8.95	5 2·0 1	9.36	1.08		

^{* &#}x27;05 level of significance; ** '01 level of significance

The 't' values for indirectness and directness are not significant. It may be stated that there is no difference between male and female social studies teachers with regard to the behaviour components.

It may also be noted from the above table that 't'-values for encouragement and restrictiveness are significant at both the levels. The null-hypothesis was rejected. It may be interpreted that male and female social studies teachers seem to have significant difference with regard to these behaviour components.

The mean of encouragement for female social studies teachers was higher than the mean of encouragement for male social studies teachers. Thus, it may be stated that female social-studies teachers use more encouragement in their non-verbal behaviour than male social studies teachers.

The mean of restrictiveness for male social studies teachers was higher than the mean of restrictiveness for female social studies teachers. Thus, it may be interpreted that the male social studies teachers use more restrictiveness in their non-verbal behaviour than female social studies teachers.

3.3 Male and Female Science Teachers—The obtained mean, S.D. and 't'-values have been presented in Table 4.16.

TABLE 4-16
Significance of Difference between Male and Female
Science Teachers with regard to Behaviour
Components

Behaviour Component			1ale = 50	Fem N=	't'-value df 96	
Co	mponent	-M	S.D.	_ M	S.D.	<i>aj</i> 90
1.	Encouragement	79.45	9.18	78.14	9.29	0.70
	Restrictiveness	22.46	13.22	21.86	9.29	0.26
	Indirectness	18.98	11.90	1 6 ·59	5.55	1.29
4.	Directness	43.71	10.78	41.95	8.30	0.90

^{* 05} level of significance; ** 01 level of significance

Table 4 16 shows that 't' of all the behaviour components for male and female social studies teachers were found to be 0.26 to 1.29, which were not significant at any level of confidence with degree of

freedom 96. Thus, the null-hypothesis was not rejected. It may be interpreted that there is no significant difference in male and female science teachers with regard to encouragement, restrictiveness, indirectness and directness behaviour components.

3.4 Language and Social Studies Teachers—The samples were reorganized to obtain language and social studies teachers. Their behaviour components were calculated separately and Mean and S.D. for the groups of each ratio The significance of mean difference in Behaviour components were tested by 't' test. The obtained statistics have been provided in Table 4-17.

TABLE 4:17

Significance of Difference Between Language and Social Studies Teachers with regard to Behaviour Components

Behaviour	Lang	u age	Social Studies N=100 't'-va					
Component	N=	101						
	M	S.D.	 M	S.D.				
 Encouragement Restrictiveness Indirectness Directness 	75·54	11·59	75·65	11·23 0·07				
	24·22	11·12	24·36	11·22 0·09				
	11·97	5·32	10·67	4·59 1·93				
	43·01	8·01	51 03	9·21 6·37**				

* ·05 level of significance; ** ·01 level of significance

The 't'-values for encouragement, restrictiveness and indirectness are not significant. It may be stated that there is no difference between language and social studies teachers with regard to these behaviour components.

The 't'-value for restrictiveness is significant at both the levels of confidence. Thus, the null-hypothesis was rejected. It may be interpreted that there is significant difference between language and social studies teachers with regard to this behaviour component.

The mean of restrictiveness (51.03) for social studies teachers was higher than the mean of restrictiveness for language teachers. It may be stated that social studies teachers seem to use restrictiveness in their non-verbal behaviour.

3.5 Social Studies and Science Teachers—The obtained results have been shown in Table 4·18.

It may be noted from Table 4·18 that 't' for indirectness and directness were 6·17 and 6·01 respectively, which were significant at both the levels with 196 degree of freedom. The null-hypothesis was rejected. It may be interpreted that social studies and science teachers seem to have significant difference with regard to these behaviour components.

The 't' for encouragement was significant at '05 level.

Significance of Difference between Social Studies and Science Teachers with regard to Behaviour Components

Behaviour		Studies =100	Scie N=	ence =98	't'-value	
Component -	M	S.D.	M	S.D.	df 196	
1. Encouragement	75.65	11.23	78.81	9.26	2 29*	
2. Restrictiveness	24.36	11.22	22.17	11-47	1.35	
3. Indirectness	10.67	4.59	17.81	9.42	6.17**	
4. Directness	51.03	9.21	42.85	9.69	6.01**	

* '05 level of significance; ** '01 level of significance

It may also be noted from the Table that 't' for restrictiveness was found to be 1.35 which is not significant at any level. The observed difference for this behaviour component of social studies and science teachers may be due to chance factor. It may be stated that there is no difference in social studies and science teachers with regard to this component.

The mean of directness (51.03) for social studies teachers was higher than the mean of directness (42.85) for science teachers. Thus, it may be stated that social studies teachers seem to use directness more.

The mean of encouragement (78.81) and indirectness (17.81) for science teachers were found to be higher than the mean of

encouragement (75.65) and indirectness (10.67) for social studies teachers. It may be interpreted that science teachers seem to use these behaviour components more.

3.6 Language and Science Teachers—The obtained mean, standard deviation and 't' of behaviour components for these two groups have been provided in Table 4·19.

TABLE 4·19
Significance of Difference between Language and
Science Teachers with regard to Behaviour
Components

Behaviour Component	Lang N=	uage 101		i <mark>ence</mark> =98	't'-value
	M	S.D.	M	\overline{SD} .	df 197
1. Encouragement	75.54	11.59	78:81	9.26	2:35*
2. Restrictiveness	24.22	11.12	22.17	11.47	1.28
3. Indirectness	11.97	5:32	17.81	9 42	4.93**
4. Directness	43.01	8:01	42.85	9.69	•13

* ·05 level of significance; ** ·01 level of significance

It may be noted from Table 4·19 that 't' of indirectness for language and social studies was 4·93 with the degree of freedom 197, which was significant at both the levels. The null-hypothesis was rejected. It may be interpreted that language and science teachers seem to have significant difference with regard to this component.

The 't'-value of encouragement (2.35) was significant at .05 level. It may be interpreted that there is significant difference between language and science teachers with regard to encouragement.

It may also be noted from the table that 't' for restrictiveness and directness were found to be 1.28 and 0.13 respectively, which are not significant at any level. The observed difference may be due to chance factor. It may be stated that there is no difference between language and science teachers with regard to these components.

The mean of encouragement and indirectness for science teachers were found to be 78 81 and 17 81 respectively, which were higher than the mean of these behaviour components for language teachers. It may be interpreted that science teachers seem to use more encouragement and indirectness.

3.7 Male and Female Teachers—There were 150 male teachers and 149 female teachers. The obtained mean, standard deviation and 't' of behaviour components for the male and female groups have been shown in Table 4.20.

TABLE 4.20

Significance of Difference Between Male and Female Teachers with regard to Behaviour Components

Behaviour	Mat $(N=)$		Femal $(N=14)$	't'-Value df 297		
Components -	M	S. D.		S.D.		
1. Encouragement	74.99	11.21	78.30	10.24	2 67**	
2. Restrictiveness	25.47	12.00	21.69	10.24	2 92**	
3. Indirectness	13.74	8.76	13.15	5.79	•69	
4. Directness	46 29	9.88	44.97	9 61	1.18	

* '05 level of significance; ** '01 level of significance

It may be noted from Table 4.20 that 't' of encouragement for male and female teachers was 2.67 with the degree of freedom 297, which was significant at both the levels. The null-hypothesis was rejected. It may be stated that male and female teachers seem to have significant difference with regard to this component.

The 't'-value of restrictiveness was found to be 2.92 which was significant at both the levels. It may be interpreted that there is significant difference betweenmale and female teachers with regard to restrictiveness.

It may also be noted from the table that 't' for indirectness and directness were found to be '69 and 1.18 respectively, which are not significant at any level. It may be stated that there is no difference between male and female teachers with regard to these components.

The mean of encouragement (2.67) was found to be higher for female teachers than male teachers. It may be interpreted that female teachers used more encouragement. The mean of restrictiveness for male teachers was found to be 25.47 which was more than the mean of restrictiveness for female teachers. It may be interpreted that male teachers seem to use more restrictiveness than female teachers.

ANALYSIS FOR THE SIGNIFICANCE OF RELATIONSHIP BETWEEN DIFFERENT BEHAVIOUR COMPONENTS

So far, all the research work on teacher behaviour has been conducted with the assumptions that verbal behaviour is representative of the total behaviour, and that verbal behaviour is positively correlated with non-verbal behaviour, that is, if a teacher is expressing his aggression in words, the same expressions come at his face. His face turns red in blood and eyes become rounded and stable. Teacher verbal behaviour is of two types-indirect and direct. Indirect verbal behaviour is considered to be the sign of teacher effectiveness. Teacher non-verbal behaviour is of two types, also-encouraging and restricting. Encouraging non-verbal behaviour is also assumed to be a chief characteristic of teacher effectiveness. If it is so, then indirect verbal behaviour must have significant positive relationship with encouraging non-verbal behaviour. Similarly, direct verbal behaviour must have significant positive relationship with restricting non-verbal behaviour. To test these significance of relationship, this additional analysis has been attempted by the investigator. Thus, to have another look, Pearson Coefficient of Correlation was used to ascertain the significance of relationship between different behaviour components. A list of coefficients of correlations for different groups has been provided in Table 4.21.

Table 4.21 indicates that only one 'r' +.276 between encouragement and indirectness for male social studies group is significant at .05 level of confidence. It may be interpreted that there is significant positive correlation between these behaviour components for male social studies group. The 'r', -.099, -.256, +.036, +.080, -.069 and +.061 for other groups of teachers are not significant at any level of significance. It may be stated that there is no significant correlation between encouragement and restrictiveness for these teachers.

It may be noted from the table that the 'r' 4.318 and + 274 between encouragement and directness are significant at .05 level of confidence for male language group and female language group respectively. It may be interpreted that there is significant positive cerrelation between these behaviour components for male and female language groups. The 'r' -137, +151, -085, +213 and +072 between encouragement and directness for other groups are not

significant even at 05 level of confidence. It may be stated that there is no significant relationship among these groups of teachers with regard to these non-verbal and verbal behaviour ratio.

TABLE 4.21

Coefficients of Correlation Between Verbal and Non-verbal
Behaviour Components with Regard to Different Groups
of Teachers

<i>Т</i>	Groups of Teachers of the degree of freedom	'r' between encourage- ment and indirectness	'r' between encourage- ment and directness	'r' between restrictive- ness and indirectness	'r' between restrictive- ness and directness
1.	Male Language (d. f.=48)	– 099	+:318*	+•153	- ·198
2.	Female Languag (d. f.=49)	e —·256	+ • 274*	+.256	—·274*
3.	Male Social Studies (d. f.=48	+:276*	—·137	-•275 ∗	+.138
4.	Female Social Studies (d. f.=48	+:036	+.151	030	—·153
5.	Male Science (d. f.=48)	+.080	- ∙085	036	+.092
6.	Female Science (d. f.=46)	− ·069	+.213	+.069	- ⋅214
7.	Total Sample (d. f.=297)	 •061	+.072	- ∙038	− ·057

* .05 level of significance : ** .01 level of significance

Table 4.21 also shows that only one 'r' —.275 between estrictiveness and indirectness for male social studies group is significant at .05 level of significance. It may be interpreted that there is significant negative correlation between these behaviour components for male social group. The 'r' values +.153, +.256, —.030, —.036, +.069 and —.038 between restrictiveness and indirectness for other groups of teachers are not significant at any level of

confidence. It may be interpreted that these non-verbal and verbal behaviour components are not significantly correlated for these groups.

It may, further, be noted from the table that the 'r' value—'274 between restrictiveness and directness for female language teachers is significant at '05 level of confidence. It may be interpreted that there is significant relationship but in negative direction. The 'r' —'198, +'138, —'153, +'092, —'214 and —'057 between restrictiveness and directness for other groups are not significant even at '05 level of confidence. It may be stated that there is no relationship between restrictiveness and directness for these groups.

CHAPTER 5

Flow Pattern Analysis of Classroom Verbal And Non-verbal Interaction

In order to understand the nature of the flow of classroom events, it becomes essential to prepare the clockwise flow diagrams and box-flow diagrams of the matrix display for pooled observations of male language, female language, male social studies, female social studies, male science and female science teachers. The present chapter embodies display of flow of behaviour with the help of clockwise flow of interaction and box-flow diagrams.

The Process of Flow Classroom Interaction

A flow diagram can form a visual display which may be more acceptable for understanding the nature and structure of the verbal and non-verbal behaviour. It is necessary to provide a feedback to teachers by analysing their observation matrices in flow diagrams. The behaviour of teachers can be compared with the help of flow diagrams. Two matrices are compared in order to find similarities and differences between two segments of interaction. Sometimes a simple matrix is compared with normative expectations in order to decide whether a particular interaction is typical or atypical. It is also possible to compare the patterns within a single matrix to a valued model, i.e. a desired or preferred state of affairs, describing in terms of a matrix, which the teacher is trying to develop.

The references about the sequence of events (what proceeds and what follows) can be predicted. By understanding the relationship between rows and columns, probability statements can be made about the flow of events in teaching. This kind of analysis produces a flow pattern which can be illustrated and indicated by arrows within the matrix. Thus, the main features of the interaction can be highlighted.

The three ways of thinking facilitate the encoding and decoding operations. Besides general concepts which denote behaviour events, code symbols or category numbers provide a "vocal short hand" for describing the same event, and finally the matrix display exhibits the meaning, in terms of communication patterns which can be understood in a few minutes. The ability to shift rapidly in the analysis of classroom interaction develops easily with a first hand experience plus reading of contemplation but seldom with one or alone.

The speculative descriptions of interaction must be logically consistent with situational setting. Basic elements of this situational setting can be identified by computing percentages, ratios and behaviour components which in turn are based on primary and secondary bits of information from the matrix.

In the present study clockwise flow of classroom interaction of teachers has been attempted to analyse the display of sequence of events for language, social studies and science teachers in combined matrices.

Drawing A Flow Chart From An Observation Matrix—In order to make a flow diagram from a matrix, knowledge of clockwise rotation of events and the difference between columns and rows are essential. To follow this procedure, a blank matrix consisting of twenty rows and twenty columns is required, which is properly labelled. The highest cell frequency of a matrix is located and circled for preparing the flow diagram. The cell of highest frequency is the starting point of flow diagram since it is the sequence of pair which occurs most often. Mostly, the cell with the highest frequency will be the (5-5) cell. However, it is possible for another cell to have the highest frequency and become the starting point (Flanders, 1966).

Once the starting point is identified, the next is to locate the event which is most likely to flow. This is done by observing the row which is designated by the second point. The highest frequency in the row other than the starting point cell is marked as the next step of the flow point. The starting point is looped by an arrow. By inspecting the column of second point the highest frequency cell is noted and encircled. It is connected by an arrow with the second step. The highest frequency should be noted only upward side from the second step, so that clockwise flow may be preserved. After locating the third point, the highest cell frequency is identified by inspecting the row towards the right side of the column and is

marked by a circle. The fourth point is connected by a little looping arrow with the third step. This procedure is continued for preparing the clockwise flow diagram. These marked cells and arrows help to clarify and understand the sequence of events within the matrix This obtained diagram is named as clockwise flow of classroom interaction.

A Box Flow Diagram—The clockwise flow diagram of classroom events is still incomprehensible to the teacher, and it is possible to draw a diagram which looks just a little less complicated. It tries to use space in ways that are proportional to the communication pattern. The steady state pairs are drawn separately related to teacher talk and pupil talk. The size of steady state pairs box should be proportional to the amount of frequency of the cell. These boxes are joined by a looping arrow by inspecting the connecting cells of matrix, what precedes and what follows. The thickness of connecting arrow is also kept in proportion to the frequencies of the cell. Thus, a box flow diagram is prepared, which may be helpful for understanding the nature and structure of verbal and non-verbal behaviour of teachers (Flanders, 1966).

Presentation and Interpretation of Classroom Interaction Patterns

The combined observation matrices were prepared for displaying the flow of classroom interaction events. These matrices were used for developing the clockwise flow diagrams for decoding the classroom interaction. The display of classroom verbal and non-verbal interaction patterns have been discussed in four parts so that the specific nature of flow of behaviour would be presented systematically:-

- (1) Language Teachers
 - 1.1 Male group
 - 1.2 Female group
 - 1.3 Comparison of male and female group
- Social Studies Teachers
 - 2.1 Male group
 - 2.2 Female group
 - 2.3 Comparison of male and female group
- (3) Science Teachers
 - 3.1 Male group
 - 3.2 Female group
 - 3.3 Comparison of male and female group

- (4) Language, Social Studies and Science Teachers regardless of their sex
 - 4.1 Language group
 - 4.2 Social Studies group
 - 4. 3 Science group
 - 4.4 Comparison of Language and Social Studies group
 - 4.5 Comparison of Social Studies and Science group
 - 4.5 Comparison of Language and Science group

1. Flow of Behaviour of Language Teachers

In the present study, the classroom interactions of 50 male and 51 female language teachers were encoded and combined observation matrix tables were prepared separately. The clockwise flow diagram and box flow diagram of male and female teachers were drawn for studying the nature of flow of behaviour in a combined matrix.

1.1 Flow of behaviour of Male Language Teachers—The clockwise flow diagram was prepared with the help of pooled matrix of male language teachers. The obtained clockwise flow of behaviour has been shown in Fig 5 1. There are 16175 tallies for the male language teachers in the marked cells. These are 81 per cent of the total tallies of the composite observation matrix. It may be noted that most of the verbal and non-verbal behaviour has been presented through circled cells and looping arrows.

It may be observed from the figure that the highest probability of starting the classroom events are from the teacher's Responsive-lecturing, because the highest frequencies (3829) are concentrating in the (5-5) cell steady state of teacher's Responsive-lecturing. The teacher's Responsive-lecturing is followed by teacher's Personal-questioning. The Personal-questioning sustains in the same state of the situation (4-4) cell. The Personal-questioning event seems to be followed by Involving-direction by the teacher, which continues in the same steady state (6-6) cell. It has two probabilities. The (6-6) cell seems to be followed by Personal-questioning and this remains in the same state (4-4) cell. The (6-6) cell also seems to be followed by Responsive-lecturing, the (6-5) cell, which remains in the same steady state (5-5) cell.

The steady state of Personal-questioning (4-4) seems to be followed by pupil response (with attentive teacher non-verbal behaviour), which again continues more than three second: (8-8)

cell. There are five probabilities. One probability is that of pupilresponse to be followed by Involving-direction by the teacher, which continues in the same state of the situation (6-6) cell. The steady

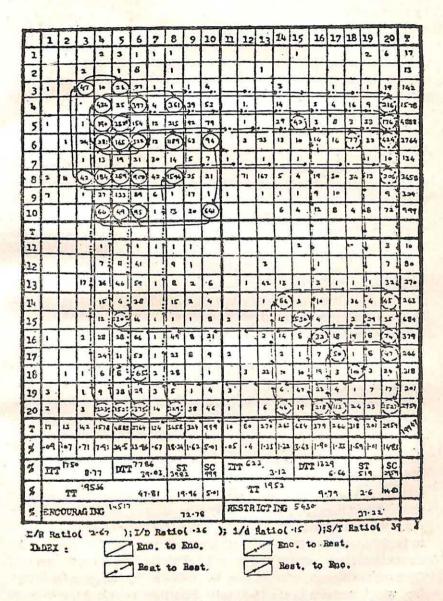


Fig. 5 1 Composite IDER Matrix of Male Language Teachers Clockwise Flow of Classroom Interaction

state of Involving-direction seems to be followed by pupil-response and this remains in the same state (8-8) cell. The steady state (6-6) cell also have three probabilities. The (6-6) cell seems to be followed by comforting-silence, the (6-10) cell, which sustains in the (10-10) steady state of comforting-silence. The (10-10) cell returns to Involving-direction, which again continues in the (6-6) cell. The (6-6) cell also seems to be followed by pupil-response (with in-attentive teacher non-verbal behaviour), the (6-18) cell, which continues in the (18-18) steady state cell. The (18-18) steady state cell returns to Involvingdirection, which again remains in the (6-6) cell. Further, the (6-6) cell also seems to be followed by Distressful Silence/confusion, which continues in the (20-20), steady state of Distressful-silence/Confusion. The (20-20) cell returns to Involving-direction by the teacher, which again sustains in the (6-6) cell. Another probability of pupil-response (attentive) is to be followed by Responsive-lecturing, the (8-5) cell. The Responsive-lecturing continues for more than three seconds, the (5-5) cell. The pupil-response (attentive) is also likely to be followed by personal-questioning, which continues for more than three seconds (4-4) cell. Next probability is that of pupil-response (attentive) to be followed by teacher's Implementary-acceptance and use of pupil ideas. It further continues more than three seconds (3-3) cell and it is followed by Responsive-lecturing, which sustains in the same state (5-5) cell. Lastly, the pupil-response may be followed by Distressful silence/confusion, which sustains in the same (20-20) cell. The (20-20) cell, steady state of Distressful-silence seems to be followed by pupil-response (attentive), which again continues in the (8-8) cell, steady state of pupil-response (attentive).

The Personal-questioning event (4-4) cell, seems to be followed by Distressful-silence/confusion, which continues in the same situation (20-20) cell. It has four probabilities. Firstly, the Distressful-silence/confusion may be interrupted by Personal-questioning, which remains in the steady state (4-4) cell. Secondly, it may also be checked by Dismissing-direction by the teacher, which sustains in the same steady state (16-16) cell. The Dismissing-direction seems to be followed by Distressful-silence/confusion, which again continues in the same state (20-20) cell. Thirdly, the steady state of Distressful-silence/confusion may be followed by Responsive-lecturing, which sustains in the (5-5) cell. Fourthly, the (20-20) cell seems to be followed by Harsh-Criticism, which continues in the same steady state of Harsh-Criticism, the (17-17) cell. The -(17-17) cell

seems to be followed by Distressful-silence/confusion, which remains in the (20-20) steady state of Distressful-silence/confusion.

The cell (5-5) steady state of Responsive-lecturing seems to be followed by Un-responsive-lecturing, which continues for more than three seconds the (15-15) cell. The (15-15) cell seems to be followed by Responsive-lecturing, which again continues in the (5-5) steady state cell.

The clockwise flow pattern analysis is still less understandable. The display of behaviour may be presented more clearly in the form of box flow diagram, which was prepared for deeper understanding of behaviour. The obtained box flow diagram for the classroom interaction of male language teachers has been shown in Fig. 5.2.

The teacher and pupil response has been marked clearly in the form of steady state pairs and transition of events. The (5-5) cell steady state of pupil response has been shown by the largest square. It has 3829, the highest tallies. The largest transitions of events are from 6th category. There were 1189, the highest transitions. It may be interpreted that the teacher provided Involving-directions to the pupils and attended the pupil responses attentively.

The (8-8) cell steady state of Responsive-lecturing has been presented by the second largest square. There are the largest transitions from category 6. It has 1189, the greatest transitions. It may be stated that the teacher orients pupil responses (attentive teacher behaviour) through Involving-directions by the teacher. There are also more transitions from category 4 and 5. And a little also from category 20.

The (20-20) cell steady state of Distressful-silence/confusion has been shown by the third largest square. There are heavy transitions from category 6. There are also more transitions from category 4 and 5. The (10-10) cell steady state of comforting-silence/confusion has been shown by the fourth largest square. There are little transitions from 4, 5 and 6 categories.

The cell (15-15) steady state of unresponsive-lecturing has been presented by the fifth largest square. It indicates very low transitions from category 5. The cell (4-4) steady state of Personal-questioning is the sixth largest square. It indicates heavy transitions from 6 and 8 categories. And also from 10 and 20 categories.

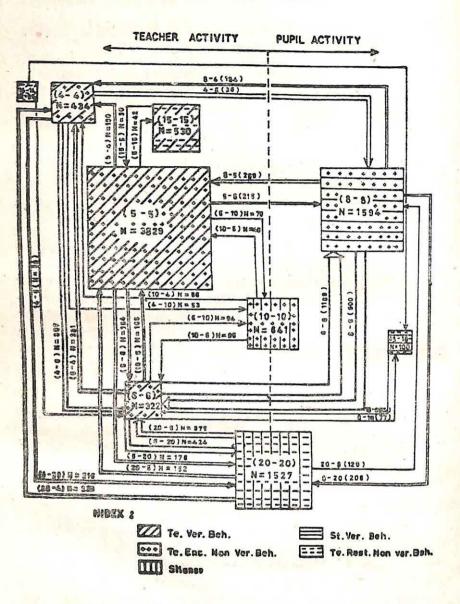


Fig. 5.2 Box Flow Diagram of Male Language Teachers

The cell (6-6) steady state of Involving-directions has been shown by seventh largest square. It indicates the heaviest transitions from category 6. It shows high transitions from 4, 5 and 20 categories and also low transitions from 10, 14 and 18 categories.

The cell (18-18) the steady state of pupil's response (inattentive teacher behaviour) indicates transitions from 6 and 14 categories. The cell (14-14) the steady state of Impersonal-questioning shows very little transitions from 6 and 18 categories.

1.2 Flow of Behaviour of Female Language Teachers—The clockwise flow diagram was prepared with the help of the composite matrix of Female language teachers. The obtained clockwise flow diagram has been presented in Fig. 5.3. There were 16288 tallies in the circled cells, amounting to 80 per cent of total tallies of the composite observation matrix. It may be stated that most of the verbal and non-verbal interaction has been shown by marked cells and looping arrows.

It may be noted from the figure that the highest probability of starting classroom events was from Responsive-lecturing, because there were highest 3133 frequencies in (5-5) cell steady state of Responsive-lecturing. The Responsive-lecturing seems to be followed by Personal-questioning and Personal-questioning events remained in steady state situation (4-4) cell. The Personal-questioning was followed by pupil-response (with attentive teacher non-verbal behaviour), which continued more than three seconds (8-8) cell. There were five probabilities. One probability was that of pupil-response (attentive) to be followed by Involving-direction by the teacher. The Involving-direction continued in the same state of the situation (6-6) The steady state of Involving-direction seems to be followed by pupil-response (attentive) and this remained in the same state (8-8) cell. The (6-6) steady state cell might be followed by Distressful-silence/confusion, which remained in the (20-20) cell, steady state of Distressful-silence/confusion. The (20-20) cell seems to be followed by Involving-direction, which sustained in the (6-6) cell. The steady state of Involving-direction might be followed by comforting-silence, which continued in the steady state (10-10) cell. The steady state of comforting-silence seems to be followed by Involvingdirection, the (10-6) cell which sustained in the (6-6) steady state cell. The steady state of Involving-direction was also likely to be followed by Harsh-criticism, which remained in the (17-17) steady

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Composite IDER Matrix of Female Language Teachers Fig. 5.3 Clockwise Flow of Classroom Interaction

state cell. The (17-17) cell seems to be followed by Involving direction (17-6) cell, which continued in the steady state situation, the (6-6) cell.

The other probability of pupil-response (attentive) was to be followed by Responsive-lecturing, the (8-5) cell. The Responsive-lecturing continued for more than three seconds, the (5-5) cell. Another probability of pupil-response was to be followed by Distressful-silence/confusion, which continued in the steady state (20-20) cell. The (20-20) cell seems to be followed by pupil-response (attentive), which again sustained in the steady state (8-8) cell. Next probability was that of pupil-response to be followed by Personal-questioning, the (8-4) cell. The Personal-questioning, continued for more than three seconds, the (4-4) cell. The last probability was that of pupil response to be followed by Implementary-use of pupil's ideas by the teacher. It further continued more than three seconds (3-3) cell and it was followed by Responsive-lecturing, which again continued for more than three seconds (5-5) cell.

The Personal-questioning event seems to be followed by Involving-direction by the teacher, which continued in the same steady state (6-6) cell. It had two probabilities. The first, being the steady state of the Involving-direction was followed by Personal-questioning and this remained in the same state (4-4) cell. The second, being the steady state of Involving-direction seems to be followed by Responsive-lecturing. The Responsive-lecturing sustained in the same steady state (5-5) cell.

It appears that the personal-questioning event was followed by Distressful-silence/confusion, which continued to be in the same situation (20-20) cell. There were four probabilities. Firstly, the Distressful-silence might be interrupted by Dismissing-direction by teacher, which sustained in the (16-16) steady state cell. The dismissing-direction seems to be followed by Distressful-silence, which remained in the same (20-20) cell. Secondly, the Distressful-silence might be broken by Personal-questioning, which continued in the same (4-4) cell. Thirdly, the Distressful-silence was followed by Harsh-criticism, which remained in the same steady state (17-17) cell. The Harsh-criticism seems to be followed by Distressful-silence/confusion which continued in the steady state of Distressful-silence. Fourthly, the steady state of Distressful-silence might be followed by Responsive-lecturing, which sustained in the steady state (5-5) cell.

The steady state of Responsive-lecturing (5-5) cell seems to be followed by Distressful-silence which continued in the same steady state situation (20-20) cell. The (20-20) cell was again followed by Responsive-lecturing which further remained in the same (5-5) steady state cell.

Further to make the clockwise flow of behaviour more comprehensible, the box flow diagram was prepared. The obtained box flow diagram for the classroom interaction of female language teachers has been shown in Fig. 5.4.

The teacher-talk and pupil-talk has been marked clearly in the form of steady state pairs and transitions of events. The (5-5) cell steady state of Responsive lecturing has been shown by the largest square. It has 3133, the highest tallies. There are the largest transitions from category 6. It has 1431, the greatest transitions. It may be stated that the teacher listened the pupil responses attentively and oriented the pupil responses through Involving-directions.

The (8-8) cell steady state of Attentive pupil response has been shown by the second largest square. The largest of transitions are from 6th category. It has 1431, the greatest transitions. It may be stated that the teacher directed pupil's responses attentively. There were heavier transitions from 4, 5 and 20 categories.

The (20-20) cell steady state of Distressful-silence/confusion has been presented by the third largest square. There were heavier transitions from 6 and 8 categories and some transitions from 4 and 5 categories. The (10-10) cell steady state of comforting-silence/confusion has been shown by the fourth largest square. There were low transitions from 4 and 6 categories.

The (4-4) cell steady state of Personal-questioning has been shown to be the fifth largest square. There were heavier transitions from 6 and 8 categories and some transitions from 5, 10 and 20 categories. The (6-6) cell steady state of Involving-direction by the teacher appeared as the sixth largest square. It had heaviest transitions from category 8, heavier transitions from 4 and 20 categories and some transitions from 5 and 10 categories. The (15-15) cell steady state of Unresponsive-lecturing indicates very low transitions from category 5.

13 Comparison of flow of Behaviour between Male and Female Language Teachers—In order to compare to flow of behaviour of

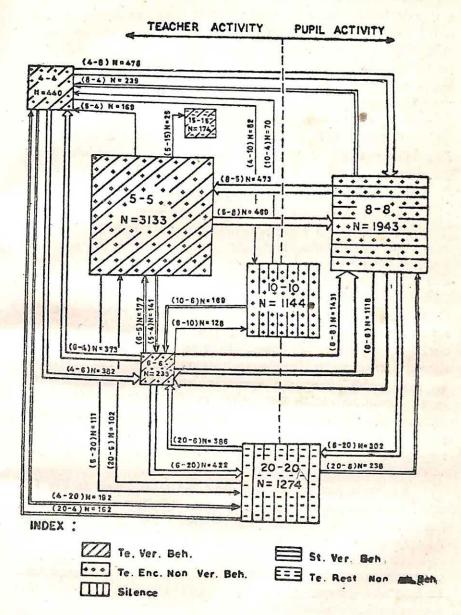


Fig. 5.4. Box Flow Diagram of Female Language Teachers

male and female language teachers flow diagrams may be looked into. Fig. 5·1 and 5·3 present the clockwise flow of classroom interaction in the composite observation matrices of male and female language teachers respectively. There are 16175 and 16288 tallies for the two groups in the marked cells. These are 81 per cent of male language teachers and 80 per cent of female language teachers and ensure an adequate selection for comparison. It may be said that there is sufficient coverage of the classroom verbal and non-verbal interactions in marked cells and looping arrows in both the matrices.

By examining figures 5.1 and 5.3 it may be remarked that most of the flow of behaviours are similar. However, there appears a little difference in the magnitude of cell frequencies. The starting point was (5-5) cell in both the groups. In both, the teacher's Personal-questioning and the pupil response (with attentive teacher non-verbal behaviour) follow each other. Sometimes, Involvingdirection or Distressful-silence interrupt the sequence. Moreover, the Pupil response is followed by Responsive-lecturing or Implementary-use of pupil ideas. It may also be followed by Involvingdirection or Distressful-silence. In both the groups, Distressfulsilence is checked by Dismissing-direction or by Harsh-criticism. In male group, Responsive-lecturing and Unresponsive-lecturing seems to follow each other, while in female group, Involvingdirection and Harsh-criticism seems to follow each other. Besides these, in male group, the Involving-direction is followed by pupilresponse (with inattentive teacher non-verbal behaviour) and vice versa.

An inspection of the box flow diagrams shown in Fig. 5.2 and 5.4 reveals that (5-5) cell steady state of Responsive lecturing has been shown by the largest square for male and female language teachers both. There are 3829 and 3133 tallies in the (5-5) cell of male and female language teachers respectively. The communication from category 6 to 8 indicates the largest transitions in both the groups. It has 1189 and 1431 tallies in both the groups respectively.

The cell (8-8) steady state of pupil response (with attentive teacher non-verbal behaviour) for both the groups has been presented by second largest square. There are 1594 and 1943 tallies in male and female language group respectively.

The cell (20-20) steady state of Distressful-silence/confusion has been shown by the third largest square. There are 1527 and 1274 tallies in both the groups respectively. The cell (10-10) steady state of comforting-silence has been presented by the fourth largest square in male and female language groups. There are 641 and 1144 tallies in both the groups respectively.

The cell (15-15) in the first group and the cell (4-4) in the second group have been presented by the fifth largest squares. These have 530 and 440 tallies respectively.

The cell (4-4) in the first group and cell (6-6) in second group have been presented by sixth largest squares. These have 434 and 239 tallies respectively.

The cell (6-6) in the first group and cell (15-15) in the second group have been presented by seventh largest squares. These have 322 and 174 tallies respectively.

The cell (18-18) steady state of Pupil-response (with inattentive teacher non-verbal behaviour) and the (14-14) cell steady state of Impersonal-questioning have been presented as the eighth and ninth largest squares for male language teachers, while these squares are absent for female language teachers. These cells have 100 and 86 tallies for male language teachers respectively.

The transitions (8-6) for male group are 900 and for female group are 1118 respectively. It indicates that for female group pupil response (attentive) was followed more by Involving-direction than for male group. The transitions (4-8) and (14-18) for male group are 361 and 36 respectively, and for female group are 478 and nil respectively. It indicates that for female group Personal-questioning was followed more by pupil response (attentive) while for male group Impersonal-questioning was followed more by pupil response (inattentive).

The (8-8) cell tallies in both groups were found to be 900 and 1118 respectively. It indicates that substantial amount of pupil-response (attentive) was developed by female language teachers.

The tallies in steady state cells of comforting-silence (10-10) for male and female groups were 641 and 1144 respectively. And the tallies in steady state cells of Distressful-silence (20-20) for both the groups were 1527 and 1274 respectively. It indicates that the com-

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Fig. 5.5 Composite IDER Matrix of Male Social Studies
Teachers Clockwise Flow of Classroom Interaction

forting silence events for female group were obtained to be much greater than male group, while the Distressful-silence events were found to be higher for male group than female group.

The tallies in steady state cells of (5-5) and (15-15) for male group were 3829 and 530 respectively, and for female group were 3133 and 174 respectively. It indicates that both, the Responsive-lecturing events and the Unresponsive-lecturing events, were higher for male group than female group.

Thus, the male and female language teachers may differ significantly in flow of interaction, transition of events and in steady state pairs. It may be stated that female language teachers have more encouraging-silence (comforting-silence) and provide listening attitude while receiving pupil responses (attentive teacher non-verbal behaviour) more than male language teachers.

2. Flow of Behaviour of Social Studies Teachers

In the present study, the classroom verbal and non-verbal interactions of 50 male and 50 female social studies teachers were observed and combined observation matrices were prepared separately. The flow diagrams were drawn for studying the nature of flow of behaviour.

2.1 Flow of Behaviour of Male Social Studies Teachers—The clockwise flow diagram was prepared with the help of the composite matrix of male social studies teachers. The obtained clockwise flow diagram has been presented in Fig 5.5. There were 15863 tallies in the circled cells, amounting to 79 per cent of total tallies of the composite observation matrix. It may be stated that most of the verbal and non-verbal interaction has been shown by marked cells and looping arrows.

It may be noted from the figure that the highest probability of starting classroom events was from Responsive-lecturing, because there were highest 4462 frequencies in (5-5) cell steady state of Responsive-lecturing. The Responsive-lecturing seems to be followed by Personal-questioning and Personal-questioning events remained in steady state situation (4-4) cell. The Personal-questioning was followed by Pupil-response (attentive), which continued more than three seconds the (8-8) cell. There are five probabilities. Firstly, the pupil-response seems to be followed by Responsive-lecturing, the (8-5) cell, which remained in the steady state (5-5) cell. Secondly, the pupil-response (attentive) also seems to be followed by Involving-

direction by teacher, the (8-6) cell. The Involving-direction continued for more than three seconds, the (6-6) cell. The (6-6) cell might be followed either by Distressful-silence (6-20) cell by comforting-silence, (6-10) cell, which continued in their steady state cells the (20-20) cell and the (10-10) cell respectively. The (20-20) cell and the (10-10) cell, both seem to be interrupted by Involving direction, the (20-6) cell and (10-6) cell respectively, which sustained in the steady state (6-6) cell. The (6-6) cell might also be followed either by pupil response (inattentive teacher non-verbal behaviour) the (6-18) cell, or by Impersonal-questioning the (6-14) cell. Both continued in their steady state situations, the (18-18) cell and (14-14) cell. Both were followed by Involving-direction the (18-6) cell and (14-6) cell, which sustained in steady state (6-6) cell. pupil-response (attentive) was likely to be followed by Distressfulsilence, the (8-20) cell, which remained in the same (20-20) cell. The (20-20) cell seems to be followed by Pupil-response (attentive), the (20-8) cell which sustained in the steady state situation, the (8-8) cell. Fourthly, the Pupil-response seems to be followed by Personalquestioning, which continued in the same state (4-4) cell. Lastly, the pupil response might be followed by Implementary-use of pupil's ideas by teacher, the (8-3) cell, which continued in the same steady state the (3-3) cell. The steady state (3-3) cell seems to be followed by Responsive-lecturing, which sustained in the steady state (5-5) cell.

Another probability was of Personal-questioning to be followed by Involving-direction by teacher. The Involving-direction sustained in the same situation (6-6) cell. The steady state of Involving-direction seems to be followed by Personal-questioning and this remained in the same state. The steady state of Involving-direction also seems to be followed by Responsive lecturing, which continued in the same (5-5) cell.

The third probability was that of personal-questioning being followed by Distressful-silence, which continued in the same situation (20-20) cell. Again there were four probabilities. Firstly, it was broken by Personal-questioning, which remained in the steady state (4-4) cell. Secondly, it might be followed by Responsive-lecturing the (20-5) cell, which sustained in the (5-5) cell. Thirdly, it was likely to be checked either by Dismissing-direction by teacher the (20-16) cell or by Harsh-criticism the (20-17) cell which continued in their steady state cells. Both are followed by Distressful-silence,

the (16-20) cell and (17-20) cell respectively and continued in the (20-20) steady state of Distressful-silence.

Lastly, the steady state of Responsive-lecturing seems directly to be followed by Distressful-silence, which remained in steady state (20-20) cell. The (20-20) cell was likely to be followed by Responsive-lecturing the (20-5) cell which again continued in the same situation the (5-5) cell.

The box flow diagram of male social studies teachers was also attempted, which has been presented in Fig. 5.6. The teacher and pupil responses have been marked clearly in the form of steady state pairs and transitions of events. The (5-5) cell steady state of Responsive-lecturing has been shown by the largest square. It has 4462, the highest tallies. The largest transitions of events were from category 8. It has 1219, the greatest transitions. It may be stated that the teacher continues his lecturing (responsively) after getting pupil's responses (attentively). There were low transitions from 4, 6, 15 and 20 categories.

The (20-20) cell steady state of Distressful-silence/confusion has been shown by the second largest square. There were 1282 tallies in this cell. There were more transitions from 6 and 8 categories and some transitions from 4 and 5 categories. The (8-8) cell steady state of pupil's responses (attentive) has been presented as the third largest square. It has 981 tallies. There were heaviest transitions from category 5, heavier transitions from category 6 and some transitions from 4 and 20 categories. The (15-15) cell steady state of Unresponsive lecturing has been shown as the fourth largest square. There were 968 tallies in this cell. It had low transitions from category 5.

The (10-10) steady state cell of comforting silence/confusion has been shown by the fifth largest square, having 369 tallies in this cell. This has got low transitions from category 6. The (4-4) steady state cell of Personal-questioning has been shown as the sixth largest square. There were 362 tallies in this cell. These had heavy transitions for 6 and 8 categories and some transitions from 5 and 20 categories. The (6-6) cell steady state of Involving-directions by the teacher has been shown by the seventh largest square, having 128 tallies in this cell. This had heavier transitions from 4, 8 and 20 categories and low transitions from 5, 10 and 14 categories. The (14-14) cell steady state of Impersonal-questioning had very low transitions from category 6.

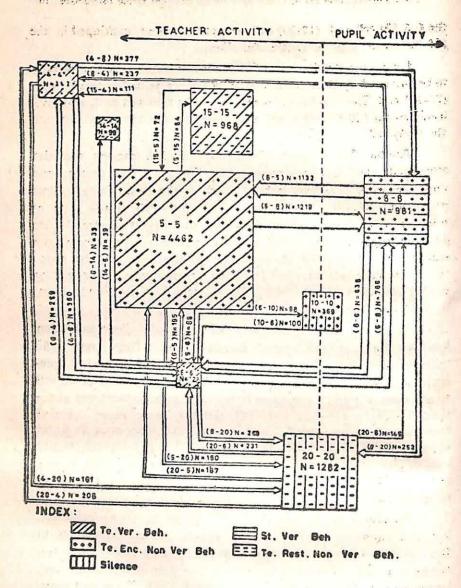


Fig. 5.6 Bix Flow Diagram of Male Social Studies Teachers

2.2 Flow of Behaviour of Female Social Studies Teachers—The clockwise flow diagram was prepared with the help of combined matrix of Female social studies teachers, and it has been shown in Fig. 5.7. There were 15865 tallies for female social studies teachers in the marked cell covering 81 per cent of the total classroom communications. It may be interpreted from the table that most of the verbal and non-verbal behaviour has been shown through circled cells and looping arrows.

It may be gathered from the figure that the highest probability of starting classroom events seems to be from the teacher's Responsive-lecturing, because the highest frequencies (5104) were concentrating in the (5-5) cell steady state of Responsivelecturing. The Responsive-lecturing was followed by Personalquestioning. The Personal-questioning continued in the same state (4-4) cell. The steady state of Personal-questioning seems to be followed by pupil-response the (4-8) cell, which further continued to the (8-8) cell. It had five probabilities. One probability was that of pupil response (attentive) to be followed by Responsive-lecturing and another by Involving-direction by teacher. Both remained in the steady state situations the (5-5) cell and (6-6) cell respectively. The (6-6) cell again had three probabilities. It might be followed either by pupil response (attentive) or by Distressful-silence. The Distressful-silence (6-20) seems to be followed by steady state (20-20) cell, which was further broken by Involving direction and continued in the same (6-6) cell. The steady state of Involving direction was also likely to be followed by comforting silence (6-10) cell which continued to (10-10) steady state cell. The steady state of comforting silence (10-10) cell seems to be broken by Involving direction (10-6) cell, which further continued to (6-6) cell. The third probability of pupil-response was being to be followed by Distressful-silence which continued in its steady state the (20-20) cell. The (20-20) cell was broken by pupil-response (attentive), the (20-8) cell, which remained in the (8-8) steady state cell. Another probability was that of pupil response (attentive) to be followed by personal questioning the (8-4) cell, which continued to (4-4) steady state cell. Still another probability was that of pupilresponse (attentive) to be followed by Implementary-use of pupil's ideas by teacher, which sustained in the same (3-3) cell. The Implementary-use of pupil's ideas seems to be followed by Responsive-lecturing, the (3-5) cell which again remained in the (5-5) cell.

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Fig. 5.7 Composite IDER Matrix of Female Social Studies Teachers Clockwise Flow of Classroom Interaction

Last probability was that of Pupil-response to be followed by Impersonal questioning the (8-14) cell, which sustained in the steady state situation. The (14-14) cell seems to be followed by Pupil-response, the (14-8) cell which further continued in the steady state (8-8) cell.

The next probability appeared that the Personal-questioning was to be followed by Involving-direction by teacher which sustained in the (6-6) cell and might be followed either by Personal-questioning or by Responsive-lecturing. Both remained in the same steady state situations.

Another probability of Personal-questioning was to be followed by Distressful-silence, which continued for more than three seconds, the (20-20) cell. There were four probabilities. It might be interrupted either by Personal-questioning or Responsive-lecturing. Both remained in the same steady state situations. It might also be broken by Dismissing-direction by teacher the (20-16) cell, which lasted longer than three seconds. It was followed by Distressful-silence, the (16-20) cell, which continued in the same (20-20) steady state cell.

The (5-5) cell steady state of Responsive-lecturing was also likely to be followed by Distressful-silence the (5-20) cell, which sustained in the same (20-20) cell. The (20-20) cell seems to be followed by Responsive-lecturing, which remained in the same (5-5) steady state cell.

The box flow diagram was also prepared for the above composite matrix table, which has been presented in Fig. 5.8. The teacher and pupil responses have been marked clearly in the form of steady state pairs and transitions of the events. The (5-5) cell steady state of the Responsive-lecturing has been shown by the largest square. It has the highest (5104) frequencies. The largest transitions of the events were from category 6. It may be stated that the teacher received the pupil responses attentively and gave Involving-directions to orient pupil responses.

The cell (8-8) steady state of pupil response (attentive teacher behaviour) has been shown as the second largest square. It has 1341 tallies. There were heaviest transitions from category 6, heavier transitions from 4 and 5 categories and some transitions from category 20. The cell (20-20) steady state of Distressful-silence/confusion has been presented as the third largest square. There were 1185

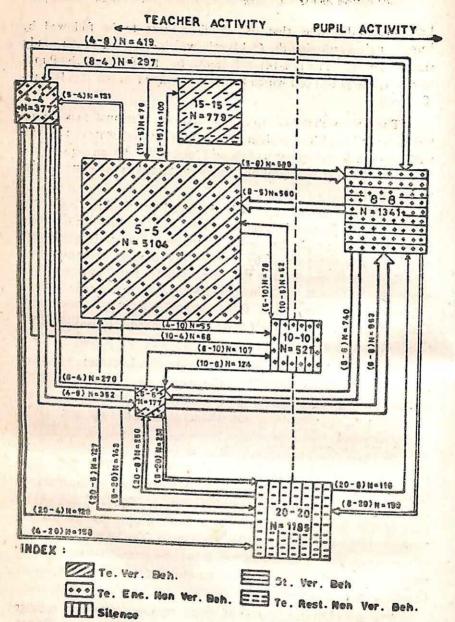


Fig. 5.8 Box Flow Diagram of Female Social-Studies Teachers

tallies in this cell. It had heavy transitions from category 6 and some transitions from 4, 5 and 8 categories.

The (15-15) cell steady state of Unresponsive-lecturing has been shown by the fourth largest square. It had 779 tallies. It had low transitions from category 5. The (10-10) cell steady state of comforting-silence/confusion has been shown by the fifth largest square. It had 521 tallies. There were transitions from 4, 5 and 6 categories.

The (4-4) cell steady state of Personal-questioning has been shown as sixth largest square. It has 377 tallies. It had heavy transitions from 6 and 8 categories and some transitions from 5, 10 and 20 categories. The (6-6) cell steady state of Involving-directions by the teacher has been shown as the seventh largest square. It possessed 177 tallies. It had heaviest transitions from category 8; heavier transitions from 4 and 20 categories and low transitions from category 10.

2.3 Comparison of Flow of Behaviour Between Male and Female Social Studies Teachers—Figures 5.5 and 5.7 present the clockwise flow of classroom interaction in the composite observation matrices of male and female social studies teachers respectively. There are 15863 and 15865 tallies for two groups in marked cells. These are 79 per cent of male group and 81 per cent of female group tallies.

By observing Fig. 5.5 and 5.7 it may be remarked that the flow of behaviours of male and female groups have similarities and differences. In both the groups, Personal-questioning is followed by pupil-response (attentive). Involving-direction of teacher and sometimes by Distressful-silence. In both the groups, pupil response (attentive) is followed by Responsive-lecturing and Involving-direction and sometimes by Distressful-silence and Implementary-use of pupil ideas. Responsive-lecturing and unresponsive-lecturing follow each other in both groups. Similarly, Distressful-silence and Dismissing-direction follow each other in male and female groups. In male group, Involving-direction is followed by Impersonal-questioning and Inattentive-pupil response, and Harsh-criticism break the Distressful-silence. In female group attentive-pupil response and Impersonal-questioning follow each other.

An observation of the box flow diagrams shown in Fig. 5.6 and 5.8 reveals that (5-5) cell steady state of Responsive-lecturing has been shown by the largest square for both the groups. These

cells have 4462 and 5104 tallies respectively. The communication from 5 to 8 categories indicates the largest transitions in both the groups. It has 1219 and 589 tallies respectively.

The cell (20-20) steady state of Distressfull-silence for male group and cell (8-8) steady state of pupil response (attentive) for female group have been shown by the second largest squares. There are 1282 and 1341 tallies in both the groups respectively.

The (8-8) cell in male group and the (20-20) cell in female group have been shown by the third largest squares. There are 981 and 1185 tallies in both the groups respectively.

The (15-15) cell steady state of Unresponsive-lecturing has been shown as the fourth lergest square in both the groups. These cells have 968 and 779 tallies respectively.

The (10-10) cell steady state of comforting-silence has been presented as the fifth largest square for both the groups. These cells have 369 and 521 tallies respectively.

The (4-4) cell steady state of Personal-questioning has been shown by the sixth largest square in both the groups. These have 362 and 377 tallies respectively.

The cell (6-6) steady state of Involving-direction has been shown as the seventh largest square having 128 and 117 tallies respectively.

In the male group, the (14-14) cell steady state of Impersonalquestioning has been presented as the eighth largest square while in female group this cell is absent. It has 99 tallies for the first group.

The transitions (8-6) for male and female group are 638 and 740. It indicates that attentive-pupil response is followed by Involving-direction more in female group than male group. The transitions from category 8 to 5 are 1132 and 560 for first and second group respectively. It indicates that in male group attentive-pupil response is followed by Responsive-lecturing more than in female group.

The tallies in (5-5) cell and (15-15) cell for first group are 4462 and 968 respectively, and for second group are 5104 and 779 respectively. It indicates that amount of Responsive-lecturing is more for female group while the amount of Unresponsive-lecturing is more for male group.

Similarly, the tallies in (10-10) cell and (20-20) cell for male group are 369 and 1282 respectively while for female group are 521 and 1185 respectively. It indicates that comforting-silence is more for female teachers and Distressful-silence is more for male teachers.

The cell (8-8) have 981 and 1341 tallies for first and second group respectively. It indicates that female teachers have more attentive-pupil response than male teachers. Besides it, the cell (14-14) have 99 tallies for male groups while it is missing for female group. It indicates that male teachers have Impersonal-questioning more than female teachers.

Thus, it may be stated that female social studies teachers, are more encouraging in their non-verbal behaviour, while male social studies teachers are more restricting in their non-verbal behaviour.

3. Flow of Behaviour of Science Teachers

To study the flow of behaviour of the science teachers, the classroom interactions of 50 male and 48 female science teachers were encoded and combined observation matrix tables were prepared. The flow diagrams were attempted for studying the nature of flow of behaviour.

3.1 Flow of Behaviour of Male Science Teachers—The clockwise flow diagram was attempted with the help of the composite matrix of Male Science teachers. Thus, the obtained clockwise flow diagram has been shown in Fig. 5.9. There were 16123 tallies in the marked cells. These amount to 79 per cent of total tallies in the combined matrix. It may be noted from the table that most of the verbal and non-verbal interaction has been shown by circled cells and looping arrows.

It may be noted from the figure that the highest probability of starting classroom events was from teacher's Responsive-lecturing, because there were highest 3493 frequencies in the (5-5) steady state cell of Responsive-lecturing. The Responsive-lecturing seems to be followed by Personal-questioning, the (5-4) cell. The Personal-questioning sustained in the same state, the (4-4) cell. The Personal-questioning was followed by pupil-response (attentive teacher nonverbal behaviour). The pupil-response remained steady, the (8-8) cell. There were five probabilities. One probability was of pupil-response to be followed by Involving-direction by teacher, which continued

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Fig. 5.9 Composite IDER Matrix of Male Science Teachers Clockwise Flow of Classroom Interaction

longer than three seconds, the (6-6) cell. Thesteady state of Involvingdirection seems to be followed by Pupil-response (attentive), which sustained in (8-8) cell. The (6-6) steady state cell might also be followed either by Distressful-silence, the (6-20) cell or by comfortingsilence, the (6-10, cell, which sustained in their steady state situations. Both steady situations seem to be followed by Involvingdirection, which continued in the steady state (6-6) cell. The Pupilresponse was also likely to be followed either by Personal-questioning or by Responsive-lecturing, which sustained in their steady state. The Pupil-response might also be followed by Distressful-silence, the (8-20) cell, which again lasted longer than three seconds, the (20-20) cell. The (20-20) cell seems to be followed by Papil-response (attentive), which continued in steady state (8-8) cell. Still another probability was of pupil-response to be followed by Implementary-use of pupil ideas, which continued for more than three seconds, the (3-3) The steady state (3-3) cell was then followed by Responsivelecturing, the (3-5) cell which remained in the same steady state situation, the (5-5) cell.

There was also a probability that Personal-questioning might be followed by Involving-direction by teacher. The Involving-direction sustained the (6-6) cell and was either followed by Personal-questioning or by Responsive-lecturing, which further prolonged.

Another probability was that the Personal-questioning was followed by Distressful-silence, which lasted longer than three seconds, the (20-20) cell. Now there appeared four probabilities. It might be interruped either by Personal-questioning, the (20-4) cell or by Responsive-lecturing, the (20-5) cell. Both prolonged in the same steady state. The (20-20) cell was likely to be checked by Harsh-criticism. The Harsh-criticism continued for more than three seconds, the (17-17) cell. The (17-17) cell was then followed by Distressful-silence, which sustained in the same steady state, the (20-20) cell. The (20-20) cell was also likely to be followed by Unresponsive-lecturing, which continued in the steady state (15-15) cell. The (15-15) cell seems to be followed by Distressful-silence which prolonged for more than three seconds, the (20-20) cell.

The steady state of Responsive-lecturing, (5-5) cell seems to be followed by Distressful-silence which prolonged for more than three seconds, the (20-20) cell. The (20-20) cell was then followed by Responsive-lecturing, which sustained in the same (5-5) cell.

The display of behaviour was also prepared in the form of box flow diagram for the male science teachers. The obtained box flow diagram for the classroom verbal and non-verbal interaction of the male science teachers has been shown in Fig. 5·10. The teacher and Pupil response has been marked clearly in the form of steady state pairs and transition of events. The (5-5) cell steady state of Responsive lecturing has been shown by the largest square. It has 3493, the highest tallies. The largest transitions of events were from 6th category. It had 1217, the greatest transitions. It may be interpreted that the teacher showed an attitude of listening, while receiving the pupil responses and imparted the Involving-directions to orient the pupil responses.

The cell (20-20) steady state of Distressful-silence/confusion has been presented by the second largest square. There were heavier transitions from 4 and 6 categories and low transitions from 5 and 8 categories. The (10-10) cell steady state of comforting-silence/confusion has been shown by the third largest square. There were low transitions from 4, 5 and 6 categories.

The (4-4) cell steady state of Personal-questioning has been shown by the fourth largest square. It had heaviest transitions from category 8, heavier transitions from 5, 6 and 20 categories and low transitions from category 10. The (8-8) cell steady state of pupil response (attentive teacher behaviour) has been presented by the fifth largest square. It indicates heaviest transitions from category 6, having 1217 tallies, heavier transitions from 4 and 5 categories and some transitions from category 20.

The (15-15) cell steady state of Unresponsive-lecturing has been shown to be the sixth largest square. It had very low transitions from category 5. The cell (6-6) steady state of Involving-directions by the teacher has been shown by the seventh largest square. It had heaviest transitions from 4, 8, 10 and 20 categories.

3.2 Flow of Behaviour of Female Science Teachers—The clockwise flow diagram was prepared with the help of combined matrix of female science teachers and it has been shown in Fig. 5.11. There were 15442 tallies for female science teachers in the marked cells, covering 80 per cent of total classroom communication. It may be interpreted from the table that most of the verbal and non-verbal behaviour has been shown through circled cells and looping arrows.

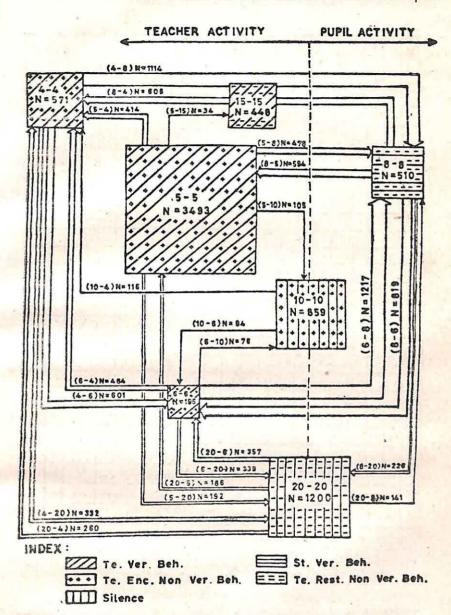


Fig. 5:10 Box Flow Diagram of Male Science Teachers

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Fig. 5.11 Composite IDER Matrix of Female Science Teachers Clockwise Flow of Classroom Interaction

It may be identified from the figure that the highest probability of starting the classroom events seems to be from teacher's Responsive-lecturing, because the highest frequencies 3480 were concentraiting in the (5-5) cell steady state of Responsive-lecturing. The Responsive-lecturing was followed by the Personal-questioning which continued in the same state (1-4) cell. The (4-4) cell seems to be followed by Pupil-response (attentive teacher non-verbal beaviour). the 4-8 cell which further continued to (8-8) cell. Now, there appeared five probabiliti s. The pupil response was followed by Involving-direction by teacher, the (8-6) cell, which prolonged for more than three seconds, the (6-6) cell. The (6-6) cell seems to be followed by Pupilresponse (attentive). The (6-6) cell again might be followed either by Distressful-silence, the (6-20) cell or by comforting-silence the (6-10) cell. Both continued for more than three seconds and then followed by lavolving-direction which prolongs for more than three seconds, the (6-6) cell. The pupil-response was also likely to be followed by personal-questioning or by Responsive-lecturing which continued in their steady state cells. The Pupil-response also seems to be followed by Distressful-silence which lasted longer than three seconds, the (20-20) cell. The (20-20) cell was followed by pupilresponse (attentive), which again continued for more than three seconds, the (8-8) cell. Still another probability was that of pupilresponse to be followed by Implementary-use of pupil ideas, the (8-3) cell, which prolonged for more than three seconds, the (3-3) cell. The (3-3) cell seems to be followed by Responsive-lecturing, the (3-5) cell which sustained in the (5-5) steady state cell.

Next probability of Personal-questioning was to be followed by Involving-direction by teacher which continued for more than three seconds, the (6-6) cell. The steady state (6-6) cell appeared to be followed either by Personal-questioning, the (6-4) cell or by Responsive-lecturing, the (6-5) cell. Both lasted longer than three seconds, the (4-4) cell and the (5-5) cell respectively.

Another probability of Personal-questioning was to be followed by Distressfull-silence, the (4-20) cell which remained in the steady state (20-20) cell. It had again three probabilities. It might be followed either by Personal-questioning or by Responsive-lecturing which continued in their steady state situations. The (20-20) cell was likely to be checked by Harsh-criticism, which prolonged for more than three seconds, the (17-17) cell. The Harsh-criticism then seems to be followed by Distressfull-silence which sustained in the same steady state, the (20-20) cell.

The steady state of Responsive-lecturing was likely to be followed by Distressful-silence which continued for more than three seconds. The (20-20) cell then seems to be followed by Responsive-lecturing, the (20-5) cell which sustained in the steady situation.

Further, to make the clockwise flow of behaviour more comprehensible, the box flow diagram was prepared. The obtained box flow diagram for the classroom verbal and non-verbal interaction of Female Science Teachers has been shown in Fig. 5-11.

The teacher and pupil-talk has been marked clearly in the form of steady state pairs and transitions of events. The (5-5) cell steady state of Responsive-lecturing has been shown by the largest square. It has 3480, the highest tallies. The largest transitions of events are from 6th category. It has 1149, the greatest transitions. It may be stated that the teacher gave the Involving-directions and attended the pupil responses attentively.

The (20-20) cell steady state of Distressful-silence/confusion has been presented by the second largest square. There were heavy transitions from 4 and 6 categories and also from 5 and 8 categories. The (10-10) cell steady state of comforting-silence/confusion has been shown by the third largest square. It had few transitions from 4, 5 and 6 categories. The (8-8) cell steady state of pupil responses (attentive) has been indicated by the fourth largest square. It had heaviest transitions from 6th category, heavier transitions from 4 and 5 categories and some transitions from category 20.

The (4-4) cell steady state of Personal-questioning has been shown to be the fifth largest square. There were heavy transitions from 4, 6 and 20 categories and few transitions from category 10. The cell (6-6) steady state of Involving-directions by the teacher appeared as the sixth largest square. It had transitions from 4, 5, 8, 10 and 20 categories.

The cell (15-15) steady state of Unresponsive-lecturing appears as the seventh largest square. It has transitions from 3 category.

3.3 Comparison of Flow of Behaviour Between Male and Female Science Teachers—The obtained clockwise flow of both the groups have been shown in Fig. 5.9 and 5.11. There are 16123 and 15442 tallies in the marked cells in both the groups respectively. These

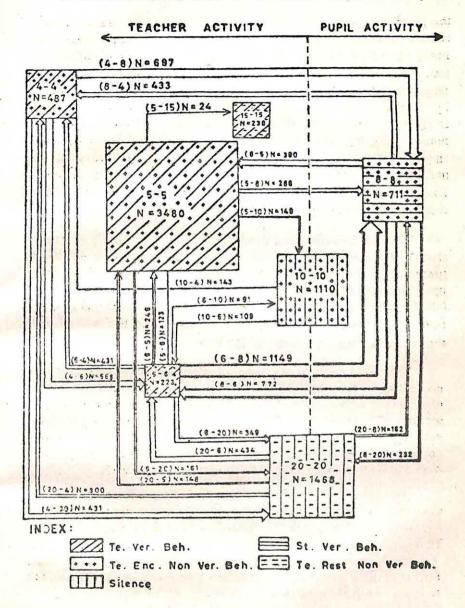


Fig. 5-12 Box Flow Diagram of Male Language Teachers

are 79 per cent of male science teachers and 80 per cent of female science teachers. By Examining both the figures, it may be said that flow of behaviours of both groups have similarities and differences too. In both groups, Personal-questioning and attentive-pupil response follow each other. Sometimes this sequence is interrupted by Involving-direction and Distressful-silence. In both groups, attentive-pupil response is followed by Involving-direction and Responsive-lecturing and sometimes also by Distressful-silence and Implementary-use of pupil ideas. Besides these, Distressful-silence and Harsh-criticism follow each other in both. In male group, Distressful-silence is also followed by Unresponsive-lecturing, while it is not so in female group.

The box flow diagrams displayed in Fig. 5·10 and 5·12 shows that the (5-5) cell steady state of Responsive-lecturing has been presented by the largest squares of both the groups. These cells have 3493 and 3480 tallies for both the groups respectively. The (10-10) cell steady state of comforting-silence and (20-20) cell steady state of Distressful-silence have been presented as the second and third largest squares respectively for both the groups.

The (4-4) cell steady state of Personal-questioning for first group and the cell (8-8) steady state of Attentive-pupil response for second group have been shown as the fourth largest squares. These cells have 571 and 711 tallies for both groups respectively. The (8-8) cell for male group and (4-4) cell for female group have been presented as the fifth largest squares. These cells have 510 and 487 tallies for both the groups respectively.

The (15-15) cell steady state of Unresponsive-lecturing for male teachers and (6-6) cell steady state of Involving-direction for female teachers have been indicated as the sixth largest squares. There are 448 and 223 tallies in both the groups respectively. The (6-6) cell in first group and (15-15) cell in second groups have been shown as the seventh largest squares. These cells have 196 and 239 tallies for both the groups respectively.

The transitions (4-8) for male and female groups are 1114 and 697 respectively and the transitions (8-4) are 606 and 433 for both the groups respectively. It indicates that Personal-questioning and Attentive-pupil response follow each other more quickly for male group than female group.

The cell (5-5) have approximately equal tallies for both groups 3493 and 3480 respectively but the cell (15-15) have 448 tallies for first group and 239 tallies for second group. It indicates that Unresponsive-lecturing is more for male group than female group.

The cell (8-8) have 510 and 711 tallies for both the groups respectively. It indicates the greater amount of Attentive-pupil response for female group.

The (10-10) cell shows 859 and 1110 tallies for first and second group respectively and the (20-20) cell have 1200 and 1468 tallies for both the groups respectively. It indicates that both types of silence is much greater for female group than male group.

4. Flow of Behaviour of Language, Social Studies and Science Teachers (Combined Groups)

In the present study, the classroom interactions of 101 Language Teachers (50 Male and 51 Female), 100 Social Studies Teachers (50 Male and 50 Female) and 98 Science Teachers (50 Male and 48 Female) were encoded and combined observation matrices were prepared separately. The flow diagrams were drawn for studying the nature of flow of behaviour.

4.1 Flow of Behaviour of Language Teachers—The clockwise flow diagram was attempted with the help of the composite matrix of Language Teachers. The obtained clockwise flow diagram has been presented in Fig. 5 13. There are 32936 tallies in the circled cells amounting to 82 per cent of total tallies of the composite observation matrix. It may be stated that most of the verbal and nonverbal interaction has been shown by marked cells and looping arrows.

Fig. 5.13 indicates that the highest probability of starting the classroom events is from Responsive-lecturing. Because the highest frequencies (6962) are concentrating in the (5-5) cell, steady state of Responsive-lecturing. The Responsive-lecturing seems to be followed by Personal-questioning (5-4) cell. Personal-questioning continues longer than three seconds, the (4-4) cell. Personal-questioning is then followed by pupil-response (attentive teacher non-verbal behaviour), the (4-8) cell, which sustained longer than three seconds (8-8) cell. The pupil-response is followed by Involving-direction by teacher, (8-6) cell. The Involving-direction continues for more than three seconds, the (6-6) cell and have five probabilities. It appears to be followed by pupil-response, the (6-8) cell which further sustains

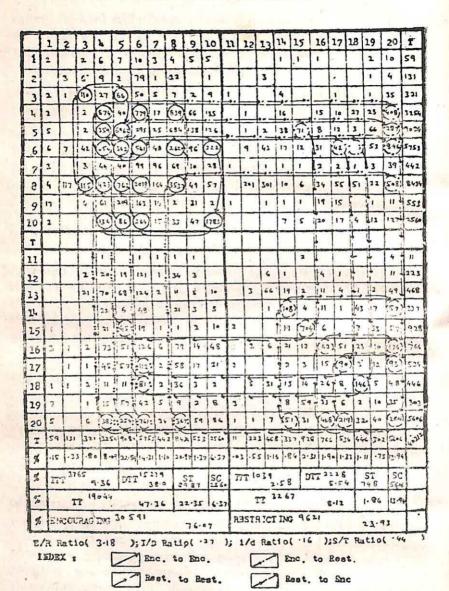


Fig. 5.13 Composite IDER Matrix of Language Teachers (Combined Group) Clockwise Flow of Classroom Interaction

longer than three seconds. It may also be followed either by Distressful-silence, the (6-20) cell or by comforting-silence, the (6-10) cell which remained in their steady state. Both steady state situations, then, are broken by Involving-direction of teacher and continues in the (6-6) steady state cell. It may be followed either by pupilresponse (with inattentive teacher non-verbal behaviour), the (6-18) cell or by Harsh-criticism, the (5.17) cell. Both remains in the steady state situations and then, are followed by Distressful-silence, the (18-20) cell and the (17-20) cell respectively which continues in the same (20-20) cell. Pupil-response is followed by Responsive-lecturing and it further remains in (5-5) cell. Pupil-response is likely to be followed by Distressful-silence, the (8-2) cell which sustains in (20-20) cell. The (20-20) cell is again followed by Pupil-response (attentive), the (20-8) cell which remains in steady state (8-8) cell. Pupil response also seems to be followed by Personal-questioning, the (8-4) cell and it further sustains in (4-4) cell Lastly, the Pupilresponse is likely to be followed by Implementary-use of pupil ideas, the (8-3) cell, which prolongs more than three seconds, the (3-3) cell. The (3-3) cell seems to be followed by Responsive-lecturing, the (3-5) cell which sustains in (5-5) cell.

Another probability of Personal-questioning is to be followed by Involving-direction of teacher. Involving-direction sustains in the same situation (6-6) cell. The steady state of Involving-direction seems to be followed either by Personal-questioning, the (6-4) cell or by Responsive-lecturing the (6-5) cell and these remain in the same state.

The next probability is that Personal-questioning is followed by Distressful-silence/confusion and it continues in the same situation (20-20) cell. The Distressful-silence seems to be broken either by Dismissing-direction, the (20-16) cell or by Personal-questioning, the (20-4) cell, which sustains in their steady states. The steady state (16-16) cell is again followed by Distressful-silence, the (16-20) cell which continues for more than three seconds. The (20-2) cell may also be followed by Responsive-lecturing, the (20-5) cell which sustains in its steady state. The Distressful-silence is also likely to be interrupted by Harsh-criticism, the (20-17) cell or by Impersonal-questioning, the (20-14) cell and these continue in their steady state, the (17-17) cell and the (16-16) cell respectively. Both are then followed by Distressful-silence and continues longer than three seconds, the (20-20) cell.

The cell (5-5) steady state of Responsive-lecturing also seems to be followed by Unresponsive-lecturing, the (5-15) cell which sustains in (15-15) cell. The (15-15) cell is, then, followed by Responsive-lecturing, which further prolongs for more than three seconds, the (5-5) cell.

The obtained box flow diagram for Language Teachers is shown in Fig. 5:14. The teacher and pupil response have been marked clearly in the form of steady state pairs and transitions of events. The (5-5) cell steady state of Responsive-lecturing has been shown by the largest square. It has the highest (6962) frequencies. The largest transitions of events are from 6 category. There are heavier transitions from category 8 and low transitions from 4, 10, 15 and 20 categories.

The cell (8-8) steady state of pupil response (attentive teacher non-verbal behaviour) has been presented the second largest square and it has 3537 tallics. There are heaviest transitions from 6 category and heavier transitions from 4 and 5 categories and also from 20 category.

The (20-20) cell steady state of Distressful-silence/confusion has been shown by the third largest square. It has 2801 tallies. There are transitions from 4, 5, 6 and 8 categories. The (10-10) cell steady state of comforting-silence has been shown as the fourth largest square. It has 1785 tallies. There are transitions from 4, 5 and 6 categories.

The cell (4-4) steady state of Personal-questioning has been presented by the fifth largest square. It has 874 tallies. There are heavier transitions from 6 and 8 categories and some transitions from 5, 10 and 20 categories.

The (15-15) cell steady state of Unresponsive-lecturing has been shown by the sixth largest square. It has 704 tallies. There are transitions from 5 category.

The (6-6) cell steady state of Involving-direction has been shown as the seventh largest square. It has 561 tallies. There are heaviest transitions from 8 category, heavier transitions from 4 and 20 categories and some transitions from 10 and 18 categories.

The (18-18) cell steady state of Pupil-response (with inattentive teacher non-verbal behaviour) has been shown as the eighth largest square. It has transitions from category 6.

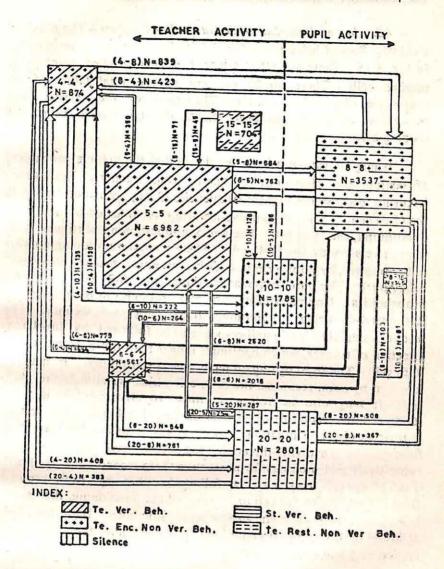
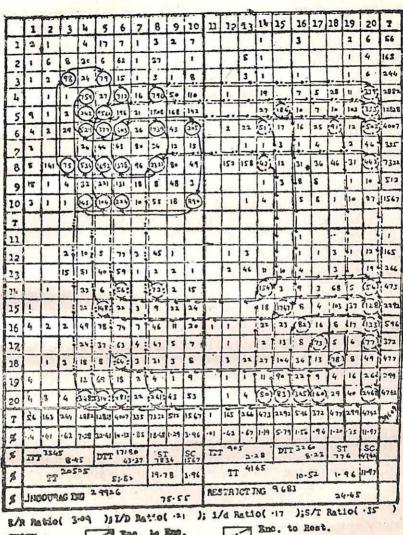


Fig. 5:14 Box Flow Diagram of Language Teachers (Combined Group)

4.2 Flow of Behaviour of Social Studies Teachers—The obtained clockwise flow of behaviour of Social Studies teachers has been shown in Fig 5.15. There are 31831 tallies for social studies teachers in marked cells. These are 80 per cent of the total tallies of the composite observation matrix. The most of the verbal and non-verbal behaviour has been shown through circled cells and looping arrows.

It may be gathered from the figure that the highest probability of starting the classroom events is from teacher's Responsivelecturing, because the highest frequencies (9566) are concentrating in the (5-5) cell. The Responsive-lecturing is followed by Personalquestioning, the (5-4) cell. The Personal-questioning continues more than three seconds, the (4-4) cell. The Personal-questioning appears to be followed by pupil-response (with attentive teacher non-verbal behaviour). The pupil-response continues, the (8-8) cell. probabilities. One probability is of pupil-response to be followed by Responsive-lecturing. It continues longer than three seconds. The second probability is of pupil-response to be followed by Involvingdirection of teacher, which continues longer than three seconds, the (6-6) cell. The (6-6) cell again have five probabilities. It may be followed by pupil-response, the (6-8) cell which sustains in the (8-8) cell. It may also be followed either by Distressful-silence, the (6-20) cell or by comforting-silence, the (6-10) cell and these remain in their steady state situations. Both steady state situations are then followed by Involving-direction, the (20-6) cell and (10-6) cell respectively and prolongs for more than three seconds, the (6-6) cell. The (6-6) cell may also be followed either by Pupil-response (inattentive), the (6-18) cell or by Impersonal-questioning, the (6-14) cell which remain in their steady state situations. Both are then followed by Involving-direction, the (18-6) cell and the (14-6) cell respectively and sustains in the (6-6) cell.

The other probability of pupil-response (attentive) is to be followed by Personal-questioning, the (8-4) cell which continues in the same situation the (4-4) cell. The pupil-response also seems to be followed by Distressful-silence, the (8-20) cell which remains in (20-20) cell. The (20-20) cell then seems to be followed by Pupil-response (attentive) and continues longer than three seconds. Another probability of Pupil-response is to be followed by Implementary-use of pupil-ideas, the (8-3) cell which sustain in (3-3)



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Fig. 5:15 Composite IDER Matrix of Social Studies Teachers (Combined Group) Clockwise Flow of Classroom Interaction

cell. The steady state Implementary-use of pupil ideas seems to be followed by Responsive-lecturing, the (3-5) cell which continues for more than three seconds, the (5-5) cell. Still another probability of pupil-response is to be followed by Impersonal-questioning, the (8-14) cell which prolongs more than three seconds, the (14-14) cell. The Impersonal-questioning is then followed by Pupil-response which continues in (8-8) cell.

There is also a probability that Personal-questioning is followed by Involving-direction of teacher, the (4-6) cell. The Involving-direction continues longer than three seconds. It may be followed either by Personal-questioning, the (6-4) cell or by Responive-lecturing, the (6-5) cell. Both continue in their steady state situations.

There is probability that Person Il-questioning is followed by Distressful-silence, the (4-20) cell. It continues more than three seconds The Distressful-silence has six probabilities. It may be followed either by Personal-questioning, the (20-4) cell or Dismissing-direction, the (20-16) cell and these remain in their steady state situations. The (16-16) cell is then again followed by Distressful-silence (16-20) cell and continues in (20-20) cell. It may also be broken either by Responsive-lecturing, the (20-5) cell or by Harsh-criticism, the (20-17) cell which sustain in the same situations. The (17-17) cell, further, seems to be followed by Distressful silence, the (17-20) cell and continues in the (20-20) cell. The steady state of Distressful-silence may also be interrupted by Unresponsivelecturing, (20-15) cell or by Impersonal-questioning, the (20-14) cell. Both remain in s eady state situations, and again are followed by Distressful-silence and continues more than three seconds, the (20-20) cell.

The steady state of Responsive-lecturing, the (5-5) cell may directly be followed by Unresponsive-lecturing, the (5-15) cell and it continues the (15-15) cell. The Unresponsive-lecturing is, then, followed by Responsive lecturing, the (15-5) cell and it sustains in (5-5) cell.

The obtained box flow diagram for the classroom interaction of Social Studies teachers has been shown in Fig. 5.16

The teacher and pupil activity has been marked clearly in the form of steady state pairs and transitions of events. The cell (5-5) steady state of Responsive-lecturing has been shown by the first

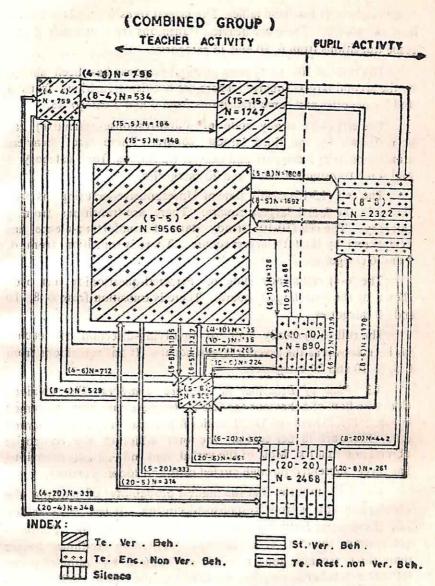


Fig. 5:16 Box Flow Diagram of Social Studies Teachers
(Combined Group)

largest square. It has 9566 tallies. The largest transitions of events are from category 8. These are heaviest transitions from category 8 and some transitions from 6, 10 and 15 categories.

The cell (20-20) steady state of Pupil-response has been shown by the second largest square. There are heavier transitions from 6 and 8 categories and some transitions from 4 and 5 categories.

The cell (8-8) steady state of Pupil-response (attentive) has been shown by the third largest square. There are heaviest transitions from 5 category and heavier transitions from category 6 and some transitions from 4 and 20 categories.

The cell (15-15) steady state of Unresponsive-lecturing has been shown by the fourth largest square. There are transitions from 5 category. The cell (10-10) steady state of comforting-silence has been shown by the fifth largest square. There is transition from 4, 5 and 6 categories.

The (4-4) cell steady state of Personal-questioning has been shown by the sixth largest square. There is transition from 6, 8, 10 and 20 categories.

The cell (6-6) steady state of Involving-direction of teacher has been shown as the seventh largest square. It has transitions from 4, 5, 8, 10 and 20 categories.

- 4.3 Flow of Behaviour of Science Teachers—The obtained clockwise flow of behaviour for Science teachers has been presented in Fig. 5.17. There are 31177 tallies for science teachers in marked cell. These are 78 per cent of the total tallies of the composite observation matrix. Most of the verbal and non-verbal behaviour has been presented through circled cells and looping arrows.
- Fig. 5·17 indicates that the highest probability of starting the classroom events is from Responsive-lecturing. It has 6973 tallies. The Responsive-lecturing seems to be followed by Personal-questioning, the (5-4) cell. Personal-questioning continues longer than three seconds and then, it is followed by pupil-response (attentive teacher non-verbal behaviour), the (4-8) cell. Pupil-response sustains longer than three seconds. The pupil-response is followed by Involving-direction (8-6) cell. The Involving-direction continues more than three seconds, the (6-6) cell. The (6-6) cell appears to be followed by pupil-response (attentive). It further sustains longer than three seconds and it continues. The Involving-direction may also be followed either by Distressful-silence, the (6-20)

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Fig. 5.17 Composite IDER Matrix of Science Teachers (Combined Group) Clockwise Flow of Classroom

Interaction



cell or by comforting-silence, the (6-10) cell and these remain in same situations. Both steady state situations are, then, followed by Involving-direction of teacher and continues in the (6-6) cell. The other probability of pupil-response is to be followed either by Personal-questioning, the (8-4) cell or by Responsive-lecturing, the (8-5) cell, which sustain in the same situations. Next probability of pupil-response is to be followed by Distressful-silence, the (8-20) cell. It continues more than three seconds (20-20) cell which is followed by pupil-response and then continues in the (8-8) cell. Still another probability of pupil-response is to be followed by Implementary-use of pupil-ideas, the (8-3) cell. It prolongs more than three seconds and seems to be followed by Responsive-lecturing (3-5) cell, which continues in (5-5) cell.

There is also a probability that Personal-questioning is followed by Involving-direction of teacher, the (4-6) cell. It continues longer than three seconds (6-6) cell. The (6-6) cell may be followed either by Personal-questioning (6-4) cell or by Responsive-lecturing, the (6-5) cell. Both remain in their steady state situations.

The Personal-questioning also appears to be followed by Distressful-silence, (4-20) cell, which sustains in (20-20) cell. The Distressful-silence may be interrupted either by Personal-questioning (20-4) cell or by Responsive-lecturing (20-5) cell which remain in the same situations. The Distressful-silence also seems to be checked by Harsh-criticism, the (20-17) cell.

The Harsh-criticism prolongs longer than three seconds, (17-17) cell. It is, then, followed by Distressful-silence which continues in (20 20) cell.

The box flow diagram was also drawn for displaying the flow of classroom events of science teachers as shown in Fig. 5·18. It indicates to use space in ways that are proportional to the verbal and non-verbal pattern. The (5-5) cell steady state of Responsive-lecturing is the largest square, because there are 6973 highest frequencies. The largest transitions of events are from category 6. There are heavier transitions from 4 and 8 categories and some transitions from 6, 10, 15 and 20 categories.

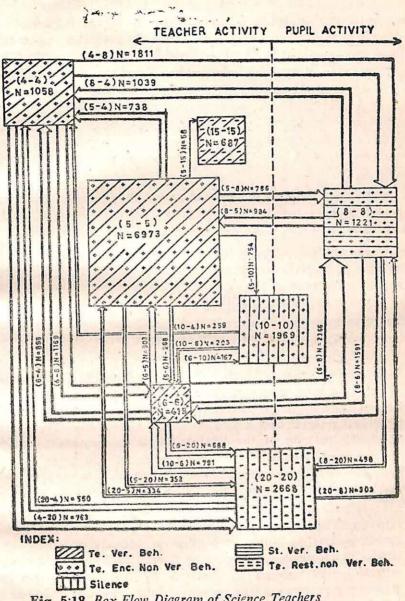


Fig. 5:18 Box Flow Diagram of Science Teachers (Combined Group)

The (20-20) cell, the second largest square, indicates steady state of Distressful-silence. It has heavier transitions from 4 and 6 categories and some transitions from 5 and 8 categories. The cell (10-10) steady state of comforting-silence has been shown as the third largest square. It has 1969 frequencies. There are transitions from 4, 5 and 6 categories.

The cell (8-8) steady state of Pupil response (with attentive teacher non-verbal behaviour) has been shown by the fourth largest square. There are heaviest transitions from category 6; heavier transitions from 4 and 5 categories and some transitions from category 20.

The (4-4) cell, steady state of Personal-questioning indicates the fifth largest square having (1058) frequencies. There are heavy transitions from 5, 6, 8 and 20 categories and also from cetegory 10.

The cell (15-15) steady state of Unresponsive-lecturing has been indicated as the sixth longest square. It has 687 tallies. There are transitions from category 5.

The (6-6) cell steady state of Involving-direction is shown as the seventh largest square. It has 419 frequencies. There are transitions from 4, 5, 8, 10 and 20 categories.

4.4 Comparison of Flow of Behaviour Between Language and Social Studies Teachers—Figs. 5.13 and 5.15 show the clockwise flow of classroom interactions in the composite observation matrices of language and social studies teachers. There were 32936 and 31831 tallies in the marked cells of both the groups respectively. These were, 82 and 80 per cent of the total tallies in the composite matrices for the two groups. The starting point of clockwise flow of behaviour is (5-5) cell steady state of Responsive-lecturing in both the groups. There were 6962 and 9566 tallies respectively.

In both the groups, Personal-questioning and Attentive-pupil response follow each other. Similarly, Personal-questioning and Involving-direction follow each other in both the groups. Sometimes, these sequences are broken by Distressful-silences. Moreover, Attentive-pupil response is followed by Involving-direction and Responsive-lecturing in both groups. Sometimes, it is followed by Distressful-silence and Implementary-use of pupil ideas.

Responsive-lecturing follow Unresponsive-lecturing and viceversa for both the groups. Involving-direction and Inattentive-pupil response follow each other in both groups. Distressful-silence is broken by Impersonal-questioning, Dismissing-direction and Harsh-criticism in both groups In language group Involving-direction and Harsh-criticism follow each other, while in social studies group, Involving-direction and Impersonal-questioning follow each other. In the second group, Attentive-pupil response and Impersonal-questioning and also Distressful-silence and Unresponsive-lecturing follow each other.

An examination of the box flow diagrams shown in Fig. 5.14 and 5.16 reveals that the (5.5) cell steady state of Responsive-lecturing have been presented by the largest squares in both the groups. These have (6962 and 9566) highest tallies of language and social studies teachers respectively. The largest transitions of events in language group was from category 6 and in social studies group was from category 5. There were 2620 and 1808 transitions in both groups respectively.

The (8-8) cell steady state of Attentive-pupil response in language group and (20-20) cell steady state of Distressful-silence in social studies group have been presented by the second largest squares, having tallies 3537 and 2467 respectively. The (20-20) cell in language group and (8-8) cell in social studies group have been shown by the third largest square. There were 2801 and 2322 tallies in the corresponding squares of first and second groups respectively.

The (10-10) cell steady state of comforting-silence in language group and (15-15) cell steady state of Unresponsive-lecturing have been presented by the fourth largest squares. These possess 1785 and 1747 tallies respectively.

The cell (4-4) steady state of Personal-questioning in language group and cell (10-10) steady state of comforting-silence in social studies group have been presented by fifth largest squares. There were 874 and 890 tallies respectively.

The cell (15-15) in first group and cell (4-4) in second group have been shown as the sixth largest square. There were 704 and and 759 tallies in both groups respectively.

The cell (6-6) steady state of Involving-direction in both the group have been shown as the seventh largest square having 561 and 305 tallies respectively. The cell (18-18) has been shown as the eighth largest square for language group only having 146 tallies.

The transitions from 8 to 6 are 2018 and 1378 respectively for language and social studies teachers. It may be stated that Attentive-pupil response is followed by Involving-direction more in language group. The transitions (8-5) are 762 and 1692 respectively for both the groups. It may be interpreted that Attentive-pupil response is followed by Responsive-lecturing more in social studies group than language group. The transitions (20-6) 761 and 461 for language and social studies teachers respectively reveals that Distressful-silence is followed by Involving direction more in language group than in social studies group.

The cell (5-5) have 6962 and 9566 tallies for first and second group respectively and cell (15-15) have 704 and 1747 tallies for both the groups respectively. It indicates that the amount of both types of lecturing is more for social studies teachers.

The cell (10-10) have 1785 and 890 tallies for language and social studies teachers respectively and cell (20-20) have 2801 and 2467 tallies for both the groups respectively. It indicates that the amount of both types of silence is more for language group.

There are 874 and 759 tallies in (4-4) cell for language and social studies groups respectively. Also, there are 3537 and 2322 tallies in (8-8) cell for both the groups respectively. It indicates that both cells have more frequencies in first group than second group. Therefore, it may be interpreted that language teachers put more Personal-questions and get more Attentive-pupil responses than social studies teachers.

4.5 Comparison of Flow of Behaviour Between Social Studies And Science Teachers—The clockwise flow of classroom interactions in the composite observation matrices of social studies and science teachers have been provided in Fig. 5.15 and 5.17. There were 31831 and 31177 tallies in the marked cells of both the groups respectively. These were 80 and 78 per cent of the composite matrices of both the groups. The starting point of clockwise flow of behaviour is (5-5) cell in both groups. There were 9566 and 6973 tallies respectively.

In both the groups, Personal-questioning and Attentive-pupil response follow each other. Sometimes this sequence is interrupted by Involving-direction and Distressful-silence. The Attentive-pupil response is followed by Responsive-lecturing and Involving-direction in both the groups. Sometimes, it is followed by Distressful-silence and Implementary-use of pupil ideas. In both the groups, Distressful-silence is checked by Harsh-criticism.

The flow of behaviours which have been identified in social studies teachers and not in science teachers may be stated as:

- (i) Responsive lecturing and Unresponsive-lecturing follow each other.
- (ii) Involving-direction is followed by Impersonal-questioning and Inattentive-pupil response and vice-versa.
- (iii) Attentive-pupil response and Impersonal-questioning follow each other.
- (iv) Distressful-silence is broken by Impersonal-questioning, Responsive-lecturing and Dismissing-direction.

In science group, Attentive-pupil response is followed by Perfunctory-use of pupil ideas.

The obtained box flow diagrams for both the groups have been presented in Fig. 5-16 and 5-18. The (5-5) cell steady state of Responsive-lecturing have been shown as the largest square in both the groups These cells have 9566 and 6973 tallies in both groups respectively.

The (20-20) cell steady state of Distressful-silence have been presented as the second largest square, having 2467 and 2668 tallies respectively.

The (8-8) cell steady state of Attentive-pupil response for social studies group and (10-10) cell steady state for science groups have been shown by the third largest squares having 2322 and 1969 tallies respectively.

The (15-15) cell steady state of Unresponsive-lecturing in social studies group and (8-8) cell steady state of Attentive-pupil response in science group represent the fourth largest squares having 1747 and 1221 tallies respectively.

The (10-10) cell of social studies group and (4-4) cell of science denotes the fifth largest squares. These have 890 and 1058 tallies respectively.

The cell (4-4) for first group and cell (15-15) for second group have been shown by the sixth largest squares. There were 759 and 687 tallies respectively.

The cell (6-6) steady state of Involving-direction have been presented as the seventh largest square for both the groups. These have 305 and 419 tallies respectively.

The transitions (4-8) are 796 and 1811 and transitions (8-4) are 534 and 1039 for first group and second group respectively. It indicates that both types of transition (4-8) and (8-4) are more for second group. It may be stated that short Personal-questions are asked by science teachers and short Attentive-responses are received by science teachers.

The transition events from category 8 to 5 are 1692 and 984 for first and second group respectively. It indicates that Attentive-pupil response is followed by Respective-lecturing more for social studies teachers. The transition (8-6) are 1378 and 1591 for first and second group respectively. It indicates that Attentive-pupil response is followed by Involving-direction more for science teachers than social studies teachers.

The cell (5-5) and (15-15) have greater tallies (9566 and 1747) respectively for social studies group than tallies (6973 and 687 respectively) for science group. It indicates that the amount of both types of lecturing is much greater for first group.

The cell (10-10) and (20-20) have more tallies for science group (1969 and 2668 respectively) than tallies for social studies group (890 and 2467 respectively). It indicates substantial amount of both type of silences for science teachers.

The tallies (8-8) cell in social studies and science groups are 2322 and 1221 respectively. The tallies in (4-4) cell of first group and second group are 759 and 1058 respectively. It indicates that the amount of Attentive-pupil responses is found to be greater for social studies teachers. The Personal-questioning is found to be higher for science teachers than social studies teachers.

4.6 Comparison of Flow of Behaviour Between Language and Science Teachers—In order to compare the flow of behaviour between language and science teachers, figs. 5:13 and 5:17 may be observed. There were 32936 and 31177 tallies in marked cell for first and second group. These represent 82 and 78 per cent in the marked cells of total tallies of matrices of both the groups respectively.

Figs. 5.13 and 5.17 indicate similarities and differences in both the groups. The common flow of behaviours may be stated as follows:

(i) Personal-questioning and Attentive-pupil response follow each other. This sequence is broken by Involving-direction and Distressful-silence.

- (ii) Attentive-pupil response is followed by Responsive-lecturing and Involving-direction.
- (iii) Sometimes, Attentive-pupil response is followed by Distressful-silence and Implementary-use of pupil ideas.
- (iv) Distressful-silence is checked by Harsh-criticism.

Some other flow of behaviour are there which are observable only in language group e.g.

- (i) Responsive-lecturing is followed by Unresponsive-lecturing and vice-versa.
- (ii) Involving-direction and Harsh-criticism follow each other.
- (iii) Similarly. Involving-direction and Inattentive-pupil response follow each other.
- (iv) Distressful-silence is interrupted by Impersonal-questioning and Dismissing-direction.

In science group only, Attentive-pupil response and Perfunctory-use of pupil ideas follow each other.

The box flow diagrams shown in fig. 5.14 and 5.18 indicate that the steady state pairs (5-5), (8-8), (20-2), (10-10), (4-4), (15-15), (6-6) and (18-18) are shown by the largest squares in descending order for language group. The steady state pairs (5.5), (2)-20), (10-10), (8-8), (4-4), (15-15) and (6-6) are shown by the largest squares in descending order for science group.

The transition from category 8 to 6 are 2018 and 1591 for first and second group respectively. In indicates that Attentive-pupil response is followed by Involving-direction more for language teachers. The transitions (4-8) are 839 and 1811 for both the groups respectively. It indicates that science teachers put more Personal-questions than language teachers.

The cell (10-10), (20-20), (5-5) and (15-15) show no significant differences in the amount of tallies of their cells.

The (4-4) cell have 874 and 1058 tallies for first and second group respectively. The (8-8) cell have 3537 and 1221 tallies for both the groups respectively. It indicates that amount of Personal-questioning is more for science group and amount of Attentive-pupil response is much more for language teachers than science teachers.

The transitions from category 5 to 4 and from category 4 to 6 are more for science teachers (738 and 1169 respectively) than for language teachers (359 and 779 respectively).

CHAPTER 6

Discussion and Conclusion

The present investigation has attempted to explore the non-verbal classroom interaction patterns of language, social studies and science teachers. The sex has also been studied as a variable. The findings are conditioned by the objectives of the study. The inferences are quite natural and have been presented here in a generalized form. The conclusions of the study suffer from the unavoidable limitations mentioned in the first chapter.

The analysis for ascertaining the significance of difference between language, social studies and science teachers has been made at three levels: the interaction categories, the behaviour ratios, and the behaviour components. An analysis of the flow of classroom interaction has been given separately. Therefore, the findings of the study have been summarized in four stages. The results and their discussion have been reported systematically in the following four parts to obtain the formulations of the study:—

- 1. Interaction Categories,
- 2. Behaviour Ratios,
- 3. Behaviour Components,
- 4. Flow of Behaviour.

1. Interaction Categories

It has been discussed in the following six sub-parts:

1.1 Male and Female Language Teachers—Male language teachers use 5, 15, 9, 19 and 20 categories more than female language teachers. Male teachers generally are not so serious as female teachers and they are not so well prepared with the questioning, and use of audio-visual aids. Naturally, they have to depend more on lecturing. Male teachers are not too rigid as far as content of the lesson plan is concerned and they give more opportunity to

pupil-participation. On the other hand, female teachers seem to be of craming nature and are more dependent on their crammed questions and they direct their lessons according to their questions. Thus, male teachers have more pupil-initiation than female teachers. Sushma Goel (1977) found that extrovert teachers use pupil-initiation more than introvert teachers. Distressful-silence is more in the classes of male teachers. It also seems due to the fact that male teachers, generally, are not well prepared and do not have questions in mind so that they can keep the students busy in teaching by questioning and an atmosphere of noise is created in the classroom. Besides these, male teachers work in the classes of male students, they are more mischievous and so less manageable and this perhaps explains greater periods of distressful-silence in their classes.

Female language teachers use 2, 12, 6, 16, 8 and 10 categories. Female teachers, generally, are well prepared with the questioning and audio-visual aids, they want to direct their lessons according to their plans and for this reason, they put sufficient amount of questions with full confidence they use more directions to students. Moreover, to direct their lessons properly and successfully they make use of praise to reinforce the right responses of pupils. More amount of pupil-response is also due to the fact that female teachers strictly follow their plans that they have planned prior to coming into the classroom and there will be more amount of pupil responses. More use of comforting-silence by female teachers may be due to the reason that, generally, female teachers are more active and keep the students busy in useful activities like silent reading, copying wordmeanings from blackboard and they superwise classes effectively. Besides these, it also seems that female teachers generally teach the female students while male teachers teach the male students. It is an observation that female students are more disciplined than male students. Owing to this reason also, comforting-silence may be more in the classes of female teachers. Twa (1979) found that male teachers had a significantly higher level of confusion than the female teachers. This finding supports the conclusion of the present investigation.

1.2 Male and Female Social Studies Teachers—Male social studies teachers use 9, 19 and 20 categories more than female social studies teachers. It indicates that male teachers use more pupilinitiation than female teachers. Santhanam, Quraishi and Lulla (1970) also found that self-initiated student-talk occurs more in men

teachers' classes. There is more distressful-silence in male teachers' classes. It means more disturbance, noise, confusion, period of no work and useless silence in the classes of male social studies teachers. This finding may be due to the reason that most of the male social studies teachers (art faculty) belong to low socio-economic status and rural areas while most of the female social studies teachers belong to high socio-economic status and urban areas. It is worth mentioning in this connection that 41 per cent reservation (17 per cent scheduled caste, 11 per cent scheduled tribes, 5 per cent Defence Personnel and 3 per cent Physically Handicapped) in Rajasthan University is for different categories. Out of this 41 per cent reservation, atleast 95 per cent candidates are male teachers who are admitted with very low percentages. Moreover, teaching is a less attractive profession for men and a large proportion of gifted students is channelized into streams of other professions and the men having low percentage choose this profession. On the other hand, teaching is well suited profession for women and the women of middle and high class families prefer it to other jobs. So, the females having a high percentage come to this profession. Thus, it may be assumed that male teachers mostly belong to low socio-economic status and rural areas while female teachers mostly belong to high socio-economic status and urban areas. It is an observation that male teachers do not come well prepared to classrooms whereas female teachers are sensitive and prepare their lessons seriously. Owing to this reason, the males have less confidence in classroom while females have higher confidence than male teachers. This might be the reason behind distressful-silence in the classes of male teachers, because male teachers are inactive and are unable to control the class and to keep them busy in the work because of their low classroom confidence

The reason again seems to be the same because language teachers. The reason again seems to be the same because language teachers also belong to arts faculty and more reservations are made in arts faculty than science faculty. The scheduled caste, scheduled tribes and other categories are not available in science subject. Hence, 90 per cent admission in science are made from general quota having higher percentage both as male and female candidates.

Male social studies teachers use 12 (incongruent praise), 15 (unresponsive-lecturing) and 17 (Harsh-criticism) categories, more than female teachers. Male teachers, generally, are not so sensitive

as are female teachers and thus, they use incongruent praise and unresponsive lecturing. Besides these, males are considered to be more aggressive and harsh than female teachers. Owing to this fact, male social studies teachers use harsh-criticism.

Female teachers use 6, 16 and 10 categories more than male teachers. The reason seems that female teachers are well prepared and they want to direct their lessons according to their preparation by using as much directions as they can. The more amount of comforting-silence may by due to the fact that female teachers work in the classes of female students who are more disciplined and create less problems of discipline than male students. In the period of silence, the female students take down notes attentively from the blackboard and the teacher supervise the class to check whether students are doing classwork or not.

Female teachers use 2 (confruent-praise), 5 (responsive-lecturing) and 7 (Firm-criticism) categories more. Finally, female teachers are more sensitive to the situation and so, they use congruent praise and responsive-lecturing more than male teachear. Female teachers are more polite and less frowning and hence, they use Firm-criticism more than male teachers.

1.3 Male and Female Science Teachers—Male science teachers use 4, 5, 15, 9 and 19 categories more. Thus, the science teaching of male teachers is content-oriented. Pupil-initiation may be more because of lack of demonstration and experimentation and because of less use of audio-visual materials by male teachers. Owing to this fact, several things may not be clear to students and to remove these ambiguities the students may put questions to teachers and in response to these questions, the teacher has to answer or lecture. Thus, there is much use of 5 and 9 categories by male science teachers.

Male science teachers use 13 and 8 categories more than female teachers. Generally, male teachers are not so sensitive as female teachers and owing to this reason, they give only a more acknowledgement to pupil ideas (Perfunctory-use of pupil ideas). Male teachers' teaching is content-oriented and so, there is more amount of pupil-response (attentive).

Female science teachers use 10 and 20 categories more than male teachers. It may be due to the fact that female teachers are more serious toward their lesson, they come well-prepared with demonstrating material for experimentation, they use plants, ani-

mals, seeds and other specimens to make their teaching effective, they give due importance to attractive charts and models in their teaching. The place of these things in teaching arouses a curiosity among the students and they try to know about them by seeing and by touching and in making these efforts they give rise to distressful-silence.

Female teachers use 2 and 3 categories more than male teachers. Generally, female teachers are more sensitive towards teaching and students, so they use congruent-praise and also give full acknowledgement and implementation of pupil-ideas.

Sikes (1971) reported that male and female teachers differ significantly on many variables. Further, Good, Sikes and Brophy (1973) compared the behaviour of eight male and eight female students. Dixit (1973) observed that sex factor was found to be significantly related to teacher behaviour. On the basis of these studies and the findings of the present study, it may be concluded that male and female language teachers, male and female social studies teachers, and male and female science teachers differ significantly with regard to the use of some verbal and non-verbal behaviours.

1.4 Language and Social Studies Teachers - Language teachers use 3, 13, 6, 16, 7, 17, 10, 20 and 4 categories more than social studies teachers. It seems that "Explaining word-meanings" is the most important step of language teaching and the teacher tries to elicit the meaning of words with the help of students. To get the correct answer the teacher has to create a number of situations to motivate and to use directions and to criticize. So, there is more use of directions and criticism by teacher in language teaching because he has to impart directions (i. e. categories 6 and 16) to stand up, to sit down and also to criticize (i. e., categories 7 and 17) the wrong responses of students. Sometimes, the teacher simply acknowledges the answer of students just by repeating in his own words (perfunctory-use of pupil ideas i. e., category 13) but sometimes, he has to explain and illustrate the answer of students, (Implementary-use of pupil ideas i. e., category 13). Besides these, in language teaching the silent-reading is the most important step of teaching rather the basis of teaching in which an opportunity is given to students to think over the content reflectively and to analyze the content. It seems that because of this silence is found more in language classes. Again, both types of silence i. e., comforting and distressful are

found in language teaching. Comforting-silence is the period of thinking and work and students may utilize silence in silent-reading and also in copying word-meanings from blackboard and teacher is able to supervise the class effectively. So, there is more amount of comforting-silence. But, when the teacher is unable to superwise the class successfully at the time of silent-reading and while the students are copying word-meanings from the blackboard, it creates noise and confusion in classroom. So, there is also more distressful-silence in language classes.

Moreover, in grammer-teaching the teacher has to use 3, 6 and 7 categories more to motivate the students and to control the students and also to keep them busy in discussion or in inductive and deductive method.

The social studies teachers use 5 and 15 categories more than language teachers. In social studies teaching there is less scope for the use of charts and models so that the teacher can get answers by means of questions with the help of students, so he has to depend more on lecturing. So, there is more use of lecturing.

The paper presented by Mr. Biswanath Roy and Mc. K. B. K. Sood (1970) reveals that high-lecturing, direct-influence and less student participation were noticed in science and social studies classes in comparison with the mathematics and language classes.

1.5 Social Studies and Science Teachers—Social studies teachers use 5, 15, 8 and 18 categories more than science teachers. In social studies teaching there is not much scope for getting answer, of questions by use of audio-visual material, charts, models, and diagrams the teacher has to depend more on lecturing. At the same time, in the absence of charts and models, the teacher feels limitations, creating appropriate students can answer correctly and so, teacher has to pass on the situations, same question to other students. This might be the reason that there is more amount of student-response. Social studies teachers use impersonal-questioning 14, dismissing-direction 16 and inattentive-pupil initiation 19 more than science teachers. It may be due to the fact that social studies teachers are students from Arts faculty who have less reasoning and analytical power and they are not so sensitive as the science teachers may be. This might be the reason that social studies teachers show more restricting-non-verbal behaviours with questioning, direction and pupil initiation.

Science teachers use 3, 13, 10 and 20 categories more than social studies teachers. There is more amount of using of pupils ideas. It means that the teacher uses students' answers, acknowledges them (Perfunctory-use of pupils' ideas) and also extend them (Implementary-use of pupils' ideas). It may be due to the fact that science teachers are more intelligent and they know how to motivate the students to answer correctly. Both types of silences - comforting as well as distressful are more in science teachers. It is comfortingsilence when the teacher demonstrates (sets) an experiment, shows a model or chart to the students. It is distressful-silence when there is noise in the classroom. It may be at the time of distributing the audiovisual material like plants and animal specimens, models and seeds. At this time control is needed but the teacher is not effective or not able to control the class. Comforting silence is more because time is also given to students to draw the diagram on their note-books. On the other hand, demonstration of a new material, new specimens (zoological or botanical), making a gas, testing the gas, using chemicals (acids and bases) they give different colours, experiments with magnet, electrical equipment, experiments showing the principle of floatation, swimming, archemedes are the things which produce curiosity among the children and the students are in a hurry to see the results why it has been like that. How attractive the colour is! Naturally, the class becomes disturbed and noise and murmuring may start giving an impression of a period of no work (distressfulsilence).

Personal-questioning 4, involving-direction 6 and attentivepupil initiation 9 are more in science teachers. It may be due to the fact that science teachers are more intelligent having more analytical and reasoning power than social studies teachers and they are more sensitive than social studies teachers. So, they show encouragingnon-verbal behaviour with questioning, direction and pupil initiation.

Mathews (1956) found that teacher-pupil verbal interaction of the science student-teachers become more familiar to that of his cooperating teachers in terms of occurrence of silence, occurrence of pauses during lecture, use of indirect influence in responding to answers to teacher questions. Nayar (1976) concluded that oral presentation took more than half the time in social sciences and least in mathematics. Malhotra (1976) found that science teachers are more indirect in their classrooms than arts teachers. On the basis of these studies and the findings of the present study, it may be concluded that social studies and science teachers differ with regard to some verbal as well as non-verbal behaviours.

1.6 Language and Science Teachers-Language teachers use 6, 16, 7, 17, 8 and 18 categories more than science teachers. language teaching, there is more emphasis on word-meaning and analytical-questions which are of high-thinking level and so, the teacher has to pass these questions on to other students again and again to get the correct and more exact and more approximate respone. In this way, there is more opportunity for studentresponse and for this, the teacher has to direct them also manytimes. Sometimes, the teacher has to criticize also to check the wrong responses. It might be the reason that there is more use of direction and criticism by the language teachers. In language teaching, impersonal-questioning 14, unresponsive-lecturing 15, inattentive-pupil initiation 19 and distressful-silence 20 are more than science teaching. It may be due to the fact that language teachers are arts-side students and they are not so intelligent with analytical and reasoning power as are science teachers. Hence, they are not more sensitive. So, they show restricting-non-verbal behaviour with questioning, lecturing, pupil-initiation and silence. In language teaching, there is not so much scope for use of attractive audio-visual material like demonstration, experimentation, as there is in science teaching. Instead of this, in language teaching extra-time is given for silent-reading, copying word-meanings. It is just possible that teachers are not able to control class and a type of confusion prevails in the classroom. It might be the reason that there is more distressful-silence in language teaching classes.

Science teachers use 4 and 5 categories more than language, teachers i. e. science teaching is more content-oriented than language teaching. Science teachers also use 3 and 13 categories more than language teachers. It means that science teachers simply acknowledge the pupils' ideas (Perfunctory-using of pupils' ideas) and also extend the pupils' ideas (Implementary-using of pupils' ideas). It may be due to the fact that science teachers are more intelligent and they know how to motivate students to answer correctly.

Science teachers use personal-questioning 4, responsive lecturing 5, attentive-pupil initiation 9 and comforting-silence 10 more than

language teachers. It may be due to the fact that science teachers are more intelligent with high inductive and deductive reasoning. Hence, they are more sensitive and analytical toward the class. So, they show encouraging non-verbal behaviour with questioning, lecturing and pupil-initiation. Comforting-silence is more because there is much scope for demonstration, drawing diagrams on blackboard, showing charts and models and dissecting animals.

Science teachers were found by Hill and Medley (1968) to be subject-matter oriented with tendencies to dominate discussion themselves (Rymonds S. Adams, 1972).

2. Behaviour Ratios

The results regarding the differences of behaviour ratios in various groups have been discussed in the following manner:

2.1 Male and Female Language Teachers-The 't'-values for E/R ratio and S/T ratio between male and female language teachers were found to be significant. The mean value for E/R ratio as well as S/T ratio was greater for female language teachers than male language teachers. It indicates that female language teachers are more encouraging non-verbally and the proportion of student-talk is more in female language teachers' classes. Ryans (1960) has pointed out that at the secondary level, women teachers have been found to be, to a greater extent, friendly, responsible, stimulating, and showing favourable attitudes towards pupils, and democratic classroom procedures, entertaining permissive educational viewpoints and verbal understanding than men teacher. Further, the female teachers seem to be more sensitive, emotional, and have more smiling facial-expressions and affirmative head nods, less frowning and are by nature softer than male teachers. Rankin (1975) on a sample of male and found that male and female teachers apper to differ significantly i.e., female teachers used gestures more than their male counterparts.

The 't'-values of I/D ratio and i/d ratio between ma'e and female language teachers are not significant but the mean value of I/D ratio is more for female language teachers than male language teachers. Thus, the female language teachers were more indirect than male language teachers i.e., they were more democratic as has been found by Ryans (1969). The mean values of i/d ratio for male and female language teachers are approximately equal. It means there is no difference between male and female language teachers as

far as motivation and control is concerned. Malhotra (1976) found that male and female teachers did not differ with regard to direct teacher classroom behaviour.

Thus, it may be inferred that male and female language teachers differ with regard to E/R and S/T ratios but they do not differ with regard to I/D and i/d ratios. It indicates the relevance of non-varbal behaviour. The slogan that silent language is more powerful than words supports the present finding, too.

2.2 Male and Female Social Studies Teachers—The t-value of E/R ratio for male and female social studies teachers is significant even at '01 level of significance. The mean value of E/R ratio is higher for female social studies teachers than male social studies teachers. The reason is the same as for female language teachers. The findings of Ryans and Rankin also support the present finding that the female social studies teachers were more encouraging non-verbally than male social studies teachers.

The t-values of I/D ratio, i/d ratio and S/T ratio are not significant. Mathew (1976) found that there was no significant difference between male and female teachers in their indirect/direct behaviour. Mehta (1976) also found that the male teachers did not differ from female teachers significantly with regard to I/D and i/d ratio. Male and female social studies teachers also do not differ with regard to S/T ratio. The reason seems that in social studies teaching unlike that of science subjects there is less scope for the use of teaching aids and questioning requires more lecturing of the teacher which results in fewer opportunities for student-talk. Obviously when the student talk itself is limited, the probability of difference between male and female social studies teachers is minimized.

The above results also indicate towards the importance of non-verbal behaviour because teachers may not differ as far as their verbal behaviour ratios are concerned but they may differ with regard to their non-verbal behaviour ratios as in this case of male and female social studies teachers.

2.3 Male and Female Science Teachers—The 't'-values of E/R ratio, I/D ratio, i/d ratio and S/T ratio are not significant at any level of significance for male and female science teachers. Male and female science teachers neither differ in their verbal behaviour ratios nor in their non-verbal behaviour ratios. It means that male and female science teachers are equally encouraging in their non-verbal

behaviour. It has already been pointed out that the question of non-verbal encouragement is related with the question of sensitivity. The more the person is sensitive, the more he/she will be encouraging non-verbally. Phillips (1975) also found significant relationship between scores on PONS (Profile Of Non-verbal Sensitivity) test developed by Robert Rosenthal et al. and "E/R ratios" of IDER. It seems that science teachers, whether male or female, are more intelligent, sensitive and analytical in their thinking and tackling the students, and thus they employ encouraging non-verbal behaviour.

The findings of Mathews (1976) and Mehta (1976) also support the present findings that male and female science teachers do not differ significantly in their verbal behaviour ratios.

2.4 Language and Social Studies Teachers—The 't'-value of E/R ratio for language and social studies teachers is not significant at any level of significance. Both, the language and social studies teachers belong to the Arts faculty who make less use of analytical thinking, hence they are not as sensitive as science teachers are. Hence both, language and social studies teachers are equally encouraging in non-verbal behaviour and there is no significant difference with regard to E/R ratio between language and social studies teachers.

The 't'-value of I/D ratio for language and social studies teachers is significant even at '01 level of significance. The mean value of I/D ratio is higher of language teachers than social studies teachers. It reveals that social studies teachers have more direct influence than language teachers. The paper presented by Biswanath Roy and B.K. Sood (1970) also reveals that more direct influence was noticed in science and social studies classes than the mathematics and language classes.

The 't'-value of i/d ratio for language and social studies teachers is not significant at any level of significance. It may be said that language and social studies teachers differ significantly on the criterion of I/D ratio but not on the criterion of i/d ratio. Again, it is a matter of sensitivity. Both, language and social studies teachers are not so sensitive and so, they do not use the categories of motivation and control.

The 't'-value of S/T ratio is significant for language and social studies teachers. The mean value of S/T ratio is greater for language teachers than social studies teachers. It indicates that language

teachers provide more opportunity for student-talk than social studies teachers. In social studies teaching, there is no much scope of the use of audio-visual aids and the teacher has to depend more on lecturing. Besides this, in language teaching there are two most important activities—"Student-Reading" and "Explaining word-meanings" in which there is more opportunity for students to participate in teaching. This may be one of the reasons that the language teachers employ more student-talk in their classroom than the social studies teachers.

2.5 Social Studies and Science Teachers—The 't'-value of E/R ratio for social studies teachers and science teachers is not significant even at 05 level of significance. However, this value may be taken as sufficient to lead us to discriminate between social studies teachers and science teachers. The mean value of E/R ratio is higher for science teachers than social studies teachers. It shows that science teachers use more encouraging non-verbal behaviour than social studies teachers. This result may be due to the fact that science teachers are more analytical and critical in observation and thinking, hence, they are more sensitive toward the situation and so, they employ more encouraging non-verbal behaviours than social studies teachers.

The 't'-value of I/D ratio is significant at 01 level of significance. The mean value of I/D ratio (·43) for science teachers is greater than social studies teachers. It indicates that science teachers are more indirect in their verbal behaviour than social studies teachers. In science, teachers have greater scope for the use of charts, models, diagrams, experimentation, demonstration, and they may use questioning technique frequently without a stop. On the other hand, in social studies teaching, the teachers have to depend more on lecturing because of less scope for questioning. This might be the reason that science teachers have higher value of I/D ratio than social studies teachers.

The 't' (180) value of i/d ratio is for socials tudies teachers and science teachers, which is not significant at any level of confidence. The mean value of i/d ratio is higher for science teachers than social studies teachers. It shows that science teachers use the categories of motivation and control more than social studies teachers. The reason seems that science teachers are more sensitive than social studies teachers and they use the categories of praise and

using of pupils ideas more. So, they have greater value of i/d ratio

The 't'-value of S/T ratio is not significant at any level of significance for social studies and science teachers. In both, there is no scope of 'student-reading' and 'explaining difficult word' like language teaching. Hence, there is chance for S/T ratio being equal in social studies and science teachers classes.

2.6 Language and Science Teachers—The 't'-value of E/R ratio is 1.002 which is not significant even at .05 level of significance for language and science teachers. Shepard (1971) also found that teachers, as a group, are more encouraging than restricting in their non-verbal communication in the social studies classes.

The 't'-value of I/D ratio is significant at 01 level of significance for language and science teachers. The mean value of I/D ratio is higher for science teachers than language teachers. It reveals that science teachers are more indirect than language teachers. In science teaching, the teacher has to depend on intelligent questions which are asked with the help of charts, models, diagrams and demonstration. At the same time, he uses the categories of motivation and control to reinforce the right response. On the other hand, in language teaching, there are the steps of 'student-reading' and 'explaining word-meanings' which are the part of student-talk. So, a major portion of class-room-time is utilized in student-talk. This might be the reason that science teachers use the categories of indirect influence more than the language teachers.

The 't'-value of i/d ratio is significant at '05 level of significance for language and science teachers. The mean value of i/d ratio is greater for science teachers than language teachers. Science teaching involves the use of observation power, inductive and deductive reasoning and analytical thinking on the part of students. At the same time, students have to be alert and attentive while the teaching is going on, to be able to follow the lesson continuously. To keep this attentiveness and alertness on the part of students throughout the period, science teachers use categories of praising and using of pupils' ideas because they are sensitive to the teaching and realize the demands of the situation. This may be the reason that the value of i/d ratio is more for science teachers than language teachers.

The 't'-value of S/T ratio is significant at both levels of significance for language and science teachers. The mean value of S/T

ratio is greater for language teachers than science teachers. This is due to the reason that in language teaching there is more opportunity for student-talk in the activities of 'student-reading' after 'modelreading' by the teacher and in 'explaining word meanings' get the right response by directing or by passing on the same question to other students. On the other hand, this is not in science teaching. Naturally student-talk is more in classes of language teachers than science teachers.

Santhanam (1974) found that the teachers differ significantly in their influence patterns (in terms of both I/D and i/d ratio) when the subject taught by them was altered. Malti Rastogi (1972) found that the findings came very significant with regard to pupil-talk and teacher-talk. There are also significant differences among subject teachers with regard to direct and indirect influence. On the basis of the findings of the present study, it may be concluded that language, social studies and science teachers differ significantly with regard to I/D, i/d and S/T ratio for verbal interaction and E/R ratio for non-verbal interactions.

2.7 Male and Female Teachers-The t-value for E/R ratio between male and female teachers were found to be significant. The mean value for E/R ratio was greater for female teachers than male teachers. It indicates that female teachers are more encouraging non-verbally than male teachers. The findings of Ryans (1960) and Rankin (1975) support this finding.

The t-value for I/D ratio, i/d ratio and S/T ratio between male and female teachers do not differ with regard to these verbal behaviour ratios Mathew (1976) and Mehta (1976) reported the same findings. It is very interesting to note that male and female teachers do not differ with regard to verbal behaviour ratios but they differ with regard to non-verbal behaviour ratios, and thus, the persent finding shows the significance of non-verbal behaviour.

3. Behaviour Components

In the present study four behaviour components have been taken into account. The results regarding the differences of behaviour ratios in various groups have been discussed in the following paragraphs:

3.1. Male and Female Language Teachers-The 't'-value of encouragement is significant at 05 level of significance for male and

female language teachers. The mean value of encouragement behaviour component is greater for female language teachers than male language teachers. The 't' value of restrictiveness behaviour component is significant at '05 level of significance for male and female language teachers. The mean value of restrictiveness is more for male language teachers than female language teachers. It indicates that female language teachers are more encouraging in their nonverbal interactions than their male counterparts, while male language teachers are more restricting in their non-verbal interactions than their female counterparts. Infact, women are credited with a softer nature and more human attitude than men. The women are considered to have the heart of mother and they are more sympathetic toward children and have more smiling facial expressions than men. Thus, it may be stated that female language teachers appear to have more encouragement behaviour component while male language teachers have more restrictiveness behaviour component.

The 't'-value of indirectness behaviour component is not significant at any level of confidence for male and female language teachers. The 't'-value of directness behaviour component is significant at 05 level of confidence for male and female language teachers. The mean value of directness behaviour component is greater for male language teachers than female language teachers. It may be interpreted that there is no difference between male and female language teachers with the criterion of indirectness behaviour component but there is significant difference with regard to directness behaviour component and the male language teachers are more direct in their verbal interactions than female language teachers. Male teachers are considered to be more authoritative than female teachers. This may be the basis that male language teachers show more direct verbal interactions than female language teachers.

3.2 Male ond Female Social Studies Teachers—The 't'-value of encouragement behaviour component is significant at '01 level of significance for male and female social studies teachers. The mean value of encouragement behaviour component is higher for female social studies teachers than male teachers. The 't'-value of restrictiveness behaviour component is significant at '01 level of significance for male and female social studies teachers. The mean value of restrictiveness behaviour component is greater for male social studies teachers than female social studies teachers. It indicates that

female social studies teachers are more encouraging in their nonverbal interactions than male teachers. While male social studies teachers are more restricting in their non-verbal interaction patterns than female teachers. The above finding is supported by the fact that women teachers are considered to have the tender heart, they behave very sympathetically having smiling facial expressions. London (1975) on the basis of his study pointed out that teachers should be trained to become more sensitive to verbal and non-verbal behaviours of individuals whose cultural and ethnic backgrounds are different. It may be noted from the above result that the female teachers are more sensitive than male teachers because they belong to urban culture and they teach the students of urban schools but male teachers come from rural culture and they have to teach students of urban schools. It has already been mentioned that teaching profession is less attractive for youngmen while it is the best suited job for young women. A major proportion of intelligent youngmen is channelized into different types of job, other than teaching. On the other hand, a major portion of intelligent youngmen came in this sophisticated profession. Besides these, youngmen of urban area do not choose this profession and they are either interested in business or they prefer other profession because they do not want to go to villages after their appointments as teachers. On the other hand, youngmen of villages have no problem in going to villages as teachers and they know this fact that there is an ample opportunity of teaching jobs in villages and they are sure of getting government jobs easily in villages particularly in Rajasthan. So, mostly youngmen from rural culture seek admission in B Ed. course while mostly young women from urban culture take admission in B. Ed. course. This perhaps explains why female teachers are more sensitive and use more encouragement behaviour component than male teachers.

The 't'-value of indirect behaviour component is not significant at any level of significance for male and female social studies teachers. The 't'-value of directness behaviour component is also not significant at any level of significance for male and female social studies teachers. It indicates that male and female social studies teachers do not differ with regard to indirectness and directness of verbal interactions. The most remarkable point is that male and female social studies teachers do not differ with regard to indirectness and directness of verbal interactions but differ significantly at '01 level of

confidence with regard to encouragement and restrictiveness behaviour components of non-verbal interactions. It supports the view that non-verbal behaviour has its own relevance in classroom teacher pupil interaction and the analysis of verbal as well as non-verbal behaviour provide more reliable information about classroom interaction. It is evident from the result of the present study that male and female teachers may not differ with regard to verbal interaction but they may differ significantly with regard to non-verbal interactions.

- 3.3 Male and Female Science Teachers -The 't'-values of encouragement, restrictiveness, indirectness and directness are not significant at any level of significance for male and female science teachers. This result may be due to the fact that both male and female science teachers are intelligent having analytical, inductive and deductive reasoning and are equally sensitive toward the teaching. Besides this, admissions in science faculty are also made from general quota having higher percentages and the reservation in science faculty is almost nil from scheduled caste, scheduled tribes, defence personnel and physically handicapped categories Both male and female teachers offering biology have ambition of becoming a doctor. Similarly, male teachers offering mathematics had ambition of becoming engineers. When they are not selected in medical and engineering courses they come in teaching profession but both, male and female science teachers are intelligent and sensitive. This might be the reason that male and female science teachers do not differ with regard to encouragement, restrictiveness, indirectess and directness behaviour components at any level of significance.
- 3.4 Language and Social Studies Teachers—The 't'-value of encouragement and restrictiveness are not significant at any level of significance for language and social studies teachers. Both, language and social studies teachers belong to the arts faculty and arts teachers do not have inductive-reasoning and analytical power like science teachers, and they are not so sensitive as science teachers are. So, both language and social studies teachers are less sensitive in comparison to science teachers or rather they are equally sensitive. This might be the reason that there is no significant difference with regard to encouragement and restrictiveness behaviour components between language and social studies teachers.

The 't'-value of indirectness is 1.93 which is not significant at any level of significance for language and social studies teachers. The mean value of indirectness is greater for language teachers than social studies teachers. The difference between the two is not significant but the tendency of indirectness is more toward language teachers than social studies teachers. The 't'-value of directness behaviour component is significant at '01 level of significance for language and social studies teachers. The mean value of directness is higher for social studies teachers than language teachers. It indicates that language teachers show more indirectness than social studies teachers, while social studies teachers show more directness than language teachers. In language teaching, there is much scope for questioning at different stages of teaching and also in explaining word-meanings the teacher can use various teaching devices. On the other hand, in social studies teaching there is not much scope for questioning and the teacher has to depend more on lecturing at the time of teaching. This may be the reason that language teachers show more indirectness and social studies teachers show more directness in their verbal interactions

3.5 Social Studies and Science Teachers - The 't'-value of encouragement behaviour component is significant at '05 level of confidence for social studies and science teachers. The mean value of encouragement behaviour component is greater for science teachers than social studies teachers. The 't'-value of restrictiveness is 1.35, which is not significant at any level of significance but this value is sufficient to assume that there is some difference between the two with regard to restrictiveness. The mean value of restrictiveness is higher for social studies teachers than science teachers. It indicates that science teachers show more encouragement while social studies teachers show more restrictiveness in their non-verbal interactions. Science teachers, who are admitted to B Ed. course, are from general quota having higher percentages in merit and the admissions from reservation quota are almost nil. Social studies teachers are admitted having low percentages in the merit list and about 36 per cent admissions are made from reservation quota from different categories like scheduled caste (17%), scheduled tribes (11%), defence personnel (5%) and the physically handicapped (3%). Hence, science teachers are more intelligent than social studies teachers and hence, they are more analytical and sensitive than social studies teachers. This might

be the reason that science teachers are more encouraging while social studies teachers are more restricting in their non-verbal interactions.

The 't'-values of indirectness and directness are significant at '01 level of significance. The mean value of indirectness is greater for science teachers than social studies teachers. The mean value of directness is higher for social studies than science teachers. In science teaching, there is much scope for questioning and the teacher can use audio-visual aids, charts, models, etc. freely while in social studies teaching there is not much scope for questioning and the teacher has to depend more on lecturing. Science teachers also use praising and using of pupil's ideas to get the answers of questions easily. This might be the reason that science teachers are more indirect than social studies teachers while social studies teachers are more direct than science teachers.

3.6 Language and Science Teachers – The 't'-value of encouragement behaviour component is significant at 05 level of significance. The mean value of encouragement is greater for science teachers than language teachers. The 't'-value of restrictiveness is 1.28 which is not significant at any level of significance but it may be stated that there is no difference between the two. The mean value of restrictiveness is higher for language teachers than science teachers. It indicates that science teachers exhibit more encouragement while language teachers exhibit more restrictiveness in their non-verbal interactions. The reason seems to be the same viz., science teachers are more sensitive than language teachers. The language teaching is offered by arts faculty student-teachers who are admitted at very low percentages.

The 't'-value of indirectness is significant at '01 level of significance for language and science teachers. The 't'-value of directness is not significant at any level of significance. It indicates that language and science teachers differ on the criterion of indirectness but do not differ on the criterion of directness. The mean value of indirectness is greater for science teachers, than language teachers. It indicates that science teachers are more indirect than social studies teachers. It also shows that science and language teachers both, are equally direct in their verbal interactions.

3.7 Male and Female Teachers - The 't'-value of encouragement is highly significant for male and female teachers. The mean

value of encouragement is greater for female teachers than male teachers. The 't'-value of restrictiveness is also highly significant for male and female teachers. The mean value of restrictiveness is higher for male teachers. It shows that female teachers are more encouraging in their non-verbal interactions than their male counterparts, while male teachers are more restricting in their non-verbal interactions than female teachers. Women are considered to be more sympathetic and to have a more human attitude and a softer nature than men. Thus, it may be inferred that female teachers appear to have more encouragement while male teachers have more restrictiveness in their non-verbal behaviour.

The 't'-values of indirectness and directness are not significant at any level of significance for male and female teachers. Mathew (1976) and Mehta (1976) also found the similar results. The present finding also supports the view that non-verbal behaviour has its own relevance in classroom interaction and the analysis of both the verbal as well as non-verbal provide more reliable and total information about classroom interaction.

3.8 Relationship between Different Verbal and Non-verbal Behaviour Components - The coefficient of correlation between encouragement and indirectness behaviour component for male language, female language, female social studies, male science, and female science groups are not significant. One 'r' (+ 276) for male social studies was significant at '05 level of significance. It means that those male social studies teachers who are indirect in their verbal behaviour, they are encouraging, too, in their non-verbal behaviour. The more democratic the teachers are, they are more humble and softer in nature. This might be the reason that there is positive relationship between encouragement and indirectness. between encouragement and indirectness for the total sample is negligible showing no relationship. French (1968) found no significant relationship between proportion of indirect verbal behaviour and proportion of encouraging non-verbal behaviour. Thus, it may be inferred that the amount of non-verbal encouragement has no relationship with the amount of verbal-indirectness.

The 'r' between encouragement and directness for male social studies, female social studies, male science, and female science groups are not significant. The 'r' between encouragement and directness

is significant for male language and female language groups but in positive sign. In language teaching, there is more emphasis on the step of 'explaining word-meanings' in which the teacher has to direct the students again and again and also he has to motivate the students to elicit the meanings of the words. Owing to this reason, it seems that there is positive relationship between encouragement and directness for male language and female language groups. The 'r' (+ 072) between these behaviour components for the total sample is negligible indicating no relationship. Thus, it may be concluded that there is no relationship between verbal-directness and non-verbal encouragement.

The 'r' between restrictiveness and indirectness for male language, female language, female social studies, male science and female science groups are not significant. One 'r' (-275) for male social studies group was significant at '05 level of significance in negative direction. It indicates that there is negative relationship between restrictiveness and indirectness for male social studies group. The basis may be that the more the teacher is democratic the less are the chances of being humble and sweet in nature. The 'r' between these behaviour components for the total sample is -038 which is not significant. Thus, it may be concluded that there is no relationship between verbal-indirectness and non-verbal-restrictiveness.

The 'r' between restrictiveness and directness for male language, male social studies, female social studies, male science and female science groups are not significant. One 'r' between restrictiveness and directness for female language group was significant in negative direction. It indicates that female language teachers may be direct in verbal behaviour but may not be restricting in non-verbal behaviour. The reason seems to be same that the language teachers while explaining word-meanings have to direct the students and to motivate them to elicit the correct response. Thus, they have to direct them so many times and have to encourage them instead to restrict non-verbally. This may be the basis that there is significant negative relationship between restrictiveness and directness. The 'r' (-057) between these behaviour components for the total sample is not significant. French (1968) also found no significant relationship between the proportion of direct verbal behaviour and restricting non-verbal behaviour. Thus, it may be inferred that there is no relationship between verbal-directness and non-verbal-restrictiveness.

The findings of the study point out that non-verbal behaviour has its own importance. One teacher may be indirect in verbal behaviour but restricting in non-verbal behaviour. It is also possible that one teacher may be direct in verbal behaviour but encouraging in non-verbal behaviour. On the basis of her study, Lail (1968) concluded:

"....Without the use of the non-verbal analysis, certain aspects of this behaviour would be puzzling and incomplete. The verbal analysis indicates two rather different patterns-question-answer-praise in one lesson and question-answer-criticism in the other. However, the praise was perfunctory and the criticism was not harsh, so that the two lessons were not so different after all. One wonders if a lesson where so much criticism is given might not be restricting, no matter how kindly the criticism is given"

The results of Lail's study also support the present findings that there is no relationship between different verbal and non-verbal behaviour components. Lail (1968), further, quoted, "....The use of non-verbal analysis along with verbal analysis enables person working with teachers, interns and student teachers to have for more information to utilize"

Thus, verbal and non-verbal behaviour components are independent of each other and the analysis of both-verbal and non-verbal provide more reliable information about classroom interaction

4. Flow of Behaviour

The interaction patterns of teachers with regard to subjects and sex have also been analysed in terms of flow of behaviour. The results of the flow of behaviour have been discussed in the following six sub-parts:

4.1 Male and Female Language Teachers—In male language teachers' classes responsive-lecturing followed by unresponsive-lecturing and vice-versa is more than in female language teachers' classes. It means that male teachers continue to lecture even when students are not ready to listen the matter. It is perhaps due to the fact that male teachers are so sensitive as female teachers are. Impersonal-questioning is followed more by distressful-silence and involving-direction is followed by inattentive-pupil response. It means that being not so sensitive as female teachers, male teachers have recourse to more impersonal-questioning Because questions are not put effectively students do not listen attentively and do not

respond and thus, distressful-silence is caused and impersonalquestioning is followed by distressful-silence. To check the distressful-silence involving-directions are given by male teachers which are again followed by inattentive-pupil response. It is, further, an expression of less sensitivity of male teachers.

In female language teachers classes personal-questioning is followed by attentive-pupil response more than in male language teachers' classes. It indicates that female teachers use encouraging non-verbal behaviours with questioning and pupil response i. e., personal and attentive encouraging non-verbal behaviours. It may be the result of more sensitiveness of female teachers. Involvingdirections are followed more by personal-questioning. Perhaps, to be sure of getting answers or to make students alert, female teachers first impart directions and then put questions. Attentive-pupil response is followed by responsive-lecturing and also sometimes it is followed by involving-directions. Pupil-response is very high and sometimes it is right and sometimes it is wrong. When it is wrong, it is followed either by lecturing or involving direction i. e., sometimes teacher, try to get answer by directing them and sometimes when they feel that students will not be able to answer they clarify it by giving lectures. This is more in female teachers due to their more sensitiveness. Comforting-silence is followed by involving-direction. Comforting-silence is due to the silent-reading and also due to copying word-meanings from black-board in note books and it is broken by involving-direction. It shows the sound teaching-learning in classes and the state of students heavily engaged in doing classwork and so the teacher has to impart directions to break this silence. Owing to the more disciplined female students, comforting-silence is followed more by involving-direction. Involving-direction is followed by harsh-criticism, when teachers find themselves unable to control students by use of involving-directions, they use harsh-criticism to achieve their end. It might be the reason that involving-direction is followed by harsh-criticism. Female teachers, being over-serious and over-attentive and in a hury to control the students, make use of harsh-criticism. Attentive pupil response is followed by Distressfulsilence. Two or more students try to answer at the same time which gives an impression of distressful-silence.

4.2 Male and Female Social Studies Teachers—In male social studies teachers' classes attentive-pupil response is followed by responsive-lecturing. It seems when teachers get inappropriate

responses they start to lecture. Being not so serious as female teachers, they put inappropriate questions to students and naturally students give inappropriate responses and then, the teacher has to start lecturing. Involving-direction is followed by impersonal-questioning and it is also followed by inattentive-pupil response. Perhaps. the teacher is not confident that students will attend to his questions seriously, so he uses first involving-directions and then puts questions with this type of fear whether students will attend to his questions seriously or not. This might be the reason that involving-direction is followed by impersonal-questioning. And also to get the answer, the teacher has to give directions to elicit responses but these responses are not correct, so they are not received by the teachers attentively. So, involving-direction is followed by inattentive-pupil response. Responsive-lecturing is followed by unresponsive-lecturing. It means that male teachers are not attentive. Hence, responsive lecturing is interrupted by unresponsive-lecturing at frequent intervals. Distressful-silence is followed by harsh-criticism. To check the distressfulsilence the teacher uses harsh-criticism Male teachers are hard by nature than female teachers. Owing to this, perhaps male teachers use harsh-criticism. Distressful-silence is followed by unresponsivelecturing. It seems an expression of less-sensitiveness of male teachers.

In female social studies teachers' classes attentive-pupil response is followed by involving-directions and also involving-direction is followed by attentive pupil response. It indicates that female teachers want to have full control over the activities of students, so that the lesson may be directed in a desired direction because female teachers are well prepared and they want to follow their lesson plans strictly. Attentive-pupil response is followed by impersonal-questioning. It seems when the teacher gets wrong responses she repeats the same questions in an impersonal way.

4.3 Male and Female Science Teachers—In male science teachers' classes impersonal-questioning and attentive-pupil response follow each other more than female science teachers' classes. It indicates that male science teachers use 'Teacher directed quick drill model' in which short questions are asked by the teacher and short responses are given by the pupils. This has been described as one of the 'Interaction Models of Critical Teaching Behaviour' by Flanders. In addition to this, attentive-pupil response is followed by

responsive-lecturing. It means that the basic drill relationship between (4-8) and (8-4) is interrupted occasionally by the teacher's explanation. Most often this break occurs as an (8-5) sequence pair in which a teacher lectures in response to a student statement. This has been described as 'Drill combined with lecture demonstration model' by Flanders. It seems that male teachers put questions demanding answers only in one or two words and they do not put thought-provoking questions because they are not so serious about teaching as female-teachers. Also, due to their this non-seriousness, unresponsive-lecturing is followed by Distressful-silence.

On the other hand, personal-questioning is followed by distress-ful-silence and distressful silence is followed by involving-direction. It seems that female teachers are more serious toward their teaching and they use more teaching-aids like charts, models, specimens and when they put questions students remain busy in enjoying teaching aids, which results in distressful-silence and ultimately the teacher has to break this silence by using involving-direction to the pupils.

4.4 Language and Social Studies Teachers-In language teachers' classes personal-questioning is followed by distressful-silence. It seems when language teachers put questions for thought-analysis, students could not answer them correctly and the teacher tries to elicit answer and it results in distressful-silence. Involving-direction is followed by personal-questioning and also by distressful-silence. Involving-direction and attentive-pupil response follow each other. Besides these, distressful-silence is followed by attentive-pupil response and also by dismissing-direction. Involving-direction is followed by Harsh-criticism, too. Thus, language teachers use more involving-directions to make students attentive to listen to the questions put by the teachers. It may be the basis that involving-direction is followed by personal-questioning. Language teachers in the steps of 'Student-Reading' and 'Explaining-word Meanings' have to instruct students to stand up to read the passage and to answer the question, and to sit down after getting the correct answer. This may be the reason that involving-direction and attentive-pupil response follow each othor. Distressful-silence is broken either by involving-direction or by dismissing-direction to check the useless silence. When these directions prove ineffective, language teachers use harsh-criticism to prevent distressful-silence. This miget be the reason that involving-direction is followed by harsh-criticism.

In social studies teachers' classes responsive-lecturing and unresponsive-lecturing follow each other. In social studies teaching there is less scope for the use of teaching aids and questioning and the teachers have to depend more on lecturing but sometimes this lecturing is not received by students attentively and the teachers do not change the pace of lecturing, not being so sensitive as science teachers. This may be the reason that responsive-lecturing is followed by unresponsive-lecturing. Attentive-pupil response is followed by personal-questioning as well as by impersonal-questioning. Attentive-pupil response is also followed by responsive-lecturing. It indicates that short-questions are asked by the teachers and also short-responses are given by the students. It has been described as 'Ouick Drill Model' by Flanders. Sometimes, this basic drill relationship of (8-4) and (4-8) is interrupted by responsive-lecturing. This has been described as "Drill combined with Lecture Demonstration Model" by Flanders under 'Model of Critical Teaching Behaviours'. In social studies teaching, teaching aids are not in abundance which can be used and the teachers write quotations, draw line diagrams, classification charts, etc. on roll-up board and with the help of these teaching aids, teachers put questions to which the students respond in echo manner by seeing the roll-up board. This might be the reason that teachers put short questions and students give short-responses and when the students responses are incorrect or incomplete, the attentive-pupil response is followed by responsivelecturing. Distressful-silence and unresponsive-lecturing follow each other. As has been stated earlier that in social studies teaching, teachers have to depend more on lecturing and sometimes this lecturing bores students and they become inactive and inattentive. At this time, noise is created and the students do not listen to the lecture attentively. This might be the reason that distressful-silence and unresponsive-lecturing follow each other

4.5 Social Studies and Science Teachers—In social studies teachers' classes responsive-lecturing and unresponsive-lecturing follow each other Actually in social studies teaching, teachers have to depend more on lecturing and sometimes this lecturing proves to be boredom for students and the teachers are not conscious of it and this results in unresponsive-lecturing. Owing to this reason, responsive-lecturing and unresponsive-lecturing follow each other. Involving-direction, attentive-pupil response and distressful-silence are followed by impersonal-questioning separately. Social studies

teachers do not use analytical and inductive reasoning and they are not so sensitive as science teachers. It may be the basis that social studies teachers put more impersonal-questioning after involving-direction, attentive-pupil response and distressful-silence. Attentive-pupil response is followed by responsive-lecturing. It seems when students' responses are inappropriate or incorrect, teachers explain by the use of lecturing. Owing to this reason attentive-pupil response is followed by responsive-lecturing. Involving-direction is followed by inattentive-pupil response. Distressful-silence is followed by unresponsive-lecturing and dismissing-direction. All this is due to the fact that social studies teachers are not so sensitive as science teachers.

In science teachers' classes personal-questioning and attentivepupil response follow each other. Personal-questioning and involving-direction also follow each other. Besides it, attentive-pupil response and involving-direction follow each other, too. It indicates that the teachers asked short questions and the students provided short-responses, both events occurred interchangingly. This is the basic drill model as has been described by Flanders. Sometimes, this basic drill appears to be interrupted by Involving-direction. This may be the basis that personal-questioning and involving-direction follow each other and also attentive-pupil response and involvingdirection follow each other. Thus, science teaching is content-centred. It may be due to the fact that science teachers are more intelligent and sensitive and also well-prepared because there is wide scope for the use of charts, specimens, demonstration and they make use of involving-direction before and after of impersonal-questioning and also before and after of student-response to keep up the pace of teaching. Attentive-pupil response is followed by perfunctory-use of pupils' ideas. It means the teachers acknowledge briefly the contribution of students to reinforce the students' responses. It may be due to the fact that science teachers use more questioning and try their best to elicit the answers and for this reason, they acknowledge briefly the students-responses. Distressful-silence and involving-direction follow each other. Distressful-silence is followed by personal-questioning. Comforting-silence is followed by personal-questioning. Actually, in science-teaching teachers show a number of teaching-aids like zoological and botanical specimens, coloured charts and multicoloured models and also demonstrate a variety of experiments which are the means of excitement for students. After this, teachers put questions to students. That is why, comforting-silence is followed by personal-questioning. But sometimes when students become excited by seeing the teaching-aids and demonstration, an environment of murmuring is created which gives an impression of distressful-silence. It may be the reason that distressful-silence is followed by personal-questioning

4.6 Language and Science Teachers-In language teachers' classes involving-direction and attentive-pupil response follow each other. The 'student-reading' and 'explaining-difficult words' are the important steps of language teaching and for this the teachers have to direct students again and again to stand up to read the prose piece or to tell the meanings of the words or to answer the comprehension and thought-analysis questions, and then they have to call them to sit down. This might be the reason that involving-direction and attentive-pupil response follow each other. Responsive-lecturing and unresponsive-lecturing follow each other. Involving-direction is followed by harsh-criticism as well as inattentive-pupil response. Distressful-silence is followed by impersonal-questioning and also by dismissing-direction. Thus, language teachers use more restricting non-verbal behaviours with verbal interaction categories. It may be due to the fact that language teachers are not so sensitive as science teachers and so, they use more restricting non-verbal interactions with verbal interactions.

In science teachers' classes personal-questioning and attentive-pupil response follow each other. Flanders called it as 'Quick Drill Model'. In this model short questions are put by the teachers and short responses are given by the students. Personal-questioning and involving-direction follow each other. Thus, the drill relationship of (8.4) and (4.8) seems to be interrupted by involving-direction. Science teachers being more sensitive use involving-direction before and after of personal-questioning to alert the students to listen to the question attentively. Distressful-silence and personal-questioning follow each other. Comforting-silence is also followed by personal-questioning. Thus, the basic drill appeared to be interrupted by comforting- or distressful-silence. The same finding has also been established by Vashishtha. Besides, science teachers use a number of attractive teaching aids and demonstration which result in comforting and distressful-silence. After showing the teaching-aids or demonstration, teachers put questions. This might be the

reason that comforting-silence and distressful-silence are followed by personal-questioning. Distressful-silence is also followed by responsive-lecturing. It seems that science teachers use responsive-lecturing to break the distressful-silence most probably the science teachers explain the demonstration or experimentation. Attentive-pupil response is followed by perfunctory-use of pupils' ideas and also by responsive-lecturing. It indicates that science teachers being more sensitive acknowledge briefly the contribution of students to reinforce the students' activity and when students' responses are insufficient they start to lecture.

Findings

On the basis of data and discussion of results, the following conclusions may be formulated:

A-Categories of Behaviours

- —— Male language teachers seem to have more tendency for 5, 15, 9, 14, 18, 19, and 20 categories. Female language teachers seem to have greater 2, 4, 6, 8, 10, 12 and 16 categories than male language teachers.
- —— Male social studies teachers use 9, 12, 15, 17, 19 and 20 categories more. Female social studies teachers seem to use 2, 5, 6, 7, 10 and 16 categories more.
- There is greater tendency for 4, 5, 8, 9, 13, 15, and 19 categories in male science teachers. Female science teachers use 2, 3, 10 and 20 categories more than male science teachers.
- --- Language teachers show the greater tendency for 3, 4, 6, 7, 10, 13, 16, 17 and 20 categories in comparison to social studies teachers, social studies teachers use 5, 14 and 15 categories more than language teachers.
- —— Social studies teachers use 5, 8, 14, 15, 16, 18 and 19 categories more than science teachers. Science teachers seem to have more tendency for 3, 4, 6, 9, 10, 13 and 20 category than social studies teachers.
- —— There is more tendency for 6, 7, 8, 14, 15, 16, 17, 18, 19 and 20 categories in language teachers than science teachers and 3, 4, 5, 9, 10 and 13 categories in science teachers than language teachers.

B-Behaviour Ratios

- —— It seems that female language teachers have significant difference from male language teachers, for E/R ratio and S/T ratio.
- There is significant difference between male and female social studies teachers for E/R ratio. The female social studies teachers show the greater tendency for this behaviour.
- There is no significant difference between male and female science teachers for any ratio.
- Language teachers differ significantly from social studies teachers for I/D ratio and S/T ratio. The mean values for these behaviour were more for language teachers.
- -- Science teachers have more I/D ratio than social studies teachers.
- There is significant difference between language and science teachers for I/D and i/d ratio. Science teachers show great tendency for these behaviours. Language teachers seem to have more student-talk than science teachers.
- -- There is significant difference between male and female teachers with regard to E/R ratio.

C-Behaviour Components

- There is significant difference between male and female language teachers for encouragement, restrictiveness and directness. Female language teachers are more encouraging non-verbally than male language teachers. Male language teachers have more restricting non-verbal behaviour and more direct verbal behaviour than female language teachers.
- Female social studies teachers seem to have more non-verbal encouragement. Male social studies teachers use more nonverbal restrictiveness.
- There is no significant difference between male and female science teachers for encouragement, restrictiveness, indirectness and directness.
- Social studies teachers were significantly more direct in their verbal behaviour than language teachers.
- -- Science teachers seem to have significant difference with encouragement and indirectness for social studies teachers.

 Science teachers show the greater tendency for these behaviours. Social studies teachers seem to have more directness than science teachers.

- —— Science and language teachers differ significantly for encouragement and indirectness. Science teachers were more encouraging non-verbally and more indirect in their verbal behaviour.
- —— There is significant difference between male and female teachers with regard to encouragement and restrictiveness
- There is no significant relationship between the amount of encouragement-non-verbal behaviour and indirect-verbal behaviour.
- There is no significant relationship between the amount of restricting-non-verbal behaviour and direct-verbal behaviour.

D-Flow Of Behaviour

- —— It appears that personal-questioning and attentive-pupil response follow each other for all teachers. Sometimes, this sequence is interrupted by involvine-direction and distressful-silence.
- It seems that attentive-pupil response is followed by involvingdirection, responsive-lecturing and implementary-use of pupil ideas for all teachers.
- It appears that male language teachers have larger transition from responsive-lecturing to unresponsive-lecturing, from impersonal-questioning to inattentive-pupil response, and from inattentive-pupil response to involving-direction, whereas female language teachers have greater transitions from harsh-criticism to involving-direction, from personal questioning to attentive-pupil response and from attentive-pupil response to involving-direction.
- Male social studies teachers seem to have greater transitions from Involving-direction to impersonal-questioning and inattentive-pupil response, and from distressful-silence to harshcriticism while in female social studies teachers, attentive pupil response is followed by impersonal-questioning, responsivelecturing and involving-direction more.
- —— Personal-questioning and attentive-pupil response follow each other more quickly in male science teacher than female science teachers.
- —— Female language teachers have more comforting-silence whereas male language teachers have more distressful-silence.
- —— Female social studies teachers have more responsive-lecturing events and comforting-silence events while male social studies

teachers have more unresponsive-lecturing events and distress-

- Unresponsive-lecturing is more for male science teachers whereas the comforting-silence and distressful-silence are more for female science teachers.
- Attentive-pupil response is followed by involving-direction more in language teachers while attentive pupil resonse is followed by responsive-lecturing more in social studies teachers. Responsive-lecturing and unresponsive-lecturing are more for social studies teachers. Comforting-silence and distressfulsilence are more for language teachers.
- Social studies teachers seem to have more transitions from responsive-lecturing to unresponsive-lecturing, from involving-direction to impersonal-questioning and inattentive-pupil response, and from distressful-silence to impersonal-questioning, responsive-lecturing and dismissing-direction whereas science teachers seem to have larger transitions from attentive-pupil response to perfunctory-use of pupil ideas.
- Attentive-pupil response is followed by responsive-lecturing more in social studies teachers and attentive-pupil response is followed by involving-direction more in science teachers. Responsive- and unresponsive-lecturing is more for social studies teachers while comforting-silence and distressful-silence is more for science teachers.
- Language teachers have more transitions from responsive-lecturing to unresponsive-lecturing, from involving-direction to harsh-criticism and inattentive-pupil response, from distressful-silence to impersonal-questioning and dismissing-direction and from attentive-pupil response to involving-direction whereas science teachers seem to have greater transitions from responsive-lecturing to personal-questioning, from personal-questioning to involving-direction and from attentive-pupil response to perfunctory-use of pupil ideas.

Implications of the Findings

This study provides a new knowledge about the classroom teacher behaviour in relation to teaching subject and sex. This study has considered both verbal and non-verbal teacher behaviour.

This knowledge may help the teacher educators in the observation and supervision of the lesson plans during teaching practice.

This new information also provides an awareness of their own verbal and non-verbal behaviours to the in-service teachers and they may utilize this knowledge to look into and modify their own behaviour.

The findings of the study may be utilized for modifying the student-teachers' behaviour. The verbal and non-verbal behaviours of student-teachers may be identified and their behaviour may be modified with the help of the findings of the study. Thus, the individual differences of secondary teachers may be properly considered for improving the teacher-effectiveness of teacher behaviour in teacher education programme. Thus, the findings of the study may be utilized as a feedback device.

The non-verbal interaction technique may be used as mechanism of feedback device for the modification of behaviour.

A number of non-verbal interaction models may be identified which may add to the theory of teacher behaviour and to understand the nature of classroom total interaction.

Limitations of Findings

In considering the results emanating from the analysis of the findings, it is important to mention that one is dealing with the conclusions from empirical data and therefore, generalization is appropriate only when made to population which it seems reasonably similar to one employed in the study. All the inferences are approximate and are based on empirical data which by their very nature are characterized by some degree of unreliability and are probability estimates. Differences, which have been noted, are in terms of averages for group of teachers, and as is true of all such findings pertaining to human behaviour, greater confidence can be placed in the conclusions, when they are applied to groups of teachers, and less when applied to the individual case. The findings are limited by, and may be expected to vary with conditions such as those noted in the introductory chapter of the report.

Suggestions for Further Avenues of Research

On the basis of present study an outline of such studies may be mentioned a follows:

—— An investigation of similar type may be designed at primary, secondary and university level.

- An experimental study may be conducted to analyse the effectiveness of training in Galloway's Indirect-Direct-Encouraging-Restricting (IDER) Verval and Non-verbal Interaction Analysis on student-teachers and in-service teachers of language, social studies and science teachers.
- The effectiveness of verbal and non-verbal interaction analysis feedback in conjunction with micro-teaching and simulated teaching may be studied.
- Non-verbal interaction patterns of extravert and introvert teachers, and creative and non-creative teachers may be explored.
- —— The effectiveness of training in IDER may be studied in relation to some other characteristics as level of aspiration, self-concept, anxiety, interest, attitude, self perception and classroom-performance of in-service or pre-service teachers at elementary or secondary level.
- —— Non-verbal-interaction analysis observation systems may be developed for different subjects, which suits best in Indian conditions.
- A comparative study of non-verbal interaction patterns of effective and ineffective teachers, may be designed.
- Non-verbal interaction patterns of teachers having different cultural backgrounds may be compared at different level.
- Non-verbal-interaction patterns of teachers working in the classes of dea. and blind students may be explored.
- —— Non-verbal interaction patterns of teachers of music, physical education and commerce teachers may be studied.

It is the hope of the investigator that the study contributes in edifice of teacher education programme especially in the area of teacher behaviour.

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Appendix-Al

RECORD SHEET

For Encoding Class Room Verbal and Non-verbal behaviour

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Appendix-A2

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Appendix-A3

The IDER Matrix

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